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WESTERN WATER BULLETIN 1991

Flow of The Colorado River and other Western Boundary Streams and Related Data

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

SAN PEDRO RIVER

WHITEWATER DRAW

1991

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FOREWORD

This bulletin is the thirty-second annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California–Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona–Sonora boundary. This bulletin contains information for the year 1991.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

COLORADO RIVER BELOW IMPERIAL DAM

Below Imperial Dam, the Colorado River flows southward 16 kilometres to the mouth of the Gila River, thence westward 18 kilometres to Pilot Knob Mountain, and south 1.6 kilometres to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 35 kilometres to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 145 kilometres to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 28,200 square kilometres along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 1,857 square kilometres below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 18,900 square kilometres below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton–Mohawk projects; and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's scheduled deliveries of waters of the Colorado River, which in 1990 amounted to 1,850,234 thousand cubic metres, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 1991.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe section of the river, 1.8 kilometres downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date, almost all Colorado River waters diverted by Mexico (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 4,483 square kilometres, of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 34 kilometres from the Pacific Ocean to join the Rio de Las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 8 kilometres to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 10 kilometres to discharge into the Pacific Ocean 3 kilometres north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States, and the flow of the Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

Whitewater Draw rises in the United States and flows south into Mexico, crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 2,650 square kilometres. A number of mountain streams in the upper reaches of the basin are diverted for irrigation, but they would normally sink or go to ground water before reaching the main water course.

FOREWORD

SAN PEDRO RIVER AT PALOMINAS, ARIZONA

The San Pedro River rises in Mexico and flows north into the United States, crossing the boundary near Palominas, Arizona and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 1,919 square kilometres, of which 1,681 square kilometres are in Mexico.

SANTA CRUZ RIVER NEAR NOGALES AND LOCHIEL, ARIZONA

The Santa Cruz River rises in the United States and flows south into Mexico, crossing the international boundary near Lochiel, Arizona and returning to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 1,380 square kilometres. Of this amount, 901 square kilometres lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

ACKNOWLEDGMENTS

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the Ministry of Agriculture and Hydraulic Resources of Mexico. Specific notation is made of each of the above named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

UNITS OF MEASURE

This Bulletin is published in System International (SI) units which are based on the metric system. The following conversion constants may be used to convert to the English system of measurement. Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units.

METRIC TO ENGLISH CONVERSION CONSTANTS

METRIC UNITS					ENGLISH UNITS
		LENGTH			
1	Millimetre	x	0.03937	=	Inch
1	Metre	x	3.28084	=	Feet
1	Kilometre	x	0.62137	=	Mile
		AREA			
1	Square Metre	x	10.76391	=	Square Feet
1	Hectare	x	2.47105	=	Acre
1	Square Kilometre	x	0.38610	=	Square Mile
		VOLUME			
1	Cubic Metre	x	35.31467	=	Cubic Feet
1,000	Cubic Metres	x	0.81071	=	Acre-Feet
		WEIGHT			
1	Kilogram	x	2.20462	=	Pounds
1	Megagram	x	1.10231	=	Tons (2,000 lbs.)
		TEMPERATURE			
1	Degree Celsius	x	1.8 + 32	=	Degree Fahrenheit

GENERAL HYDROLOGIC CONDITIONS FOR 1991

COLORADO RIVER

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was no significant amount in 1991. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 1991 measured at 5 index stations was 9 millimetres compared to an average of 66 millimetres during the last 33 years (1959 to 1991).

The flow of the Colorado River reaching Imperial Dam was 7,112,370 thousand cubic metres, about 69% of the 57-year average (1935-1991) of 10,253,254 thousand cubic metres. At the Northerly International Boundary, the total flow of the river during 1991 was 1,708,318 thousand cubic metres, about 35% of the 1935-1991 average of 4,950,597 thousand cubic metres. At the Southerly International Boundary, the flow during 1991 was 2,804 thousand cubic metres, or less than 1% of the 1935-1991 average of 3,533,814 thousand cubic metres.

The total of all flows of the Colorado River entering Mexico in 1991 amounted to 2,049,763 thousand cubic metres, 38% of the 1935-1991 average of 5,402,367 thousand cubic metres, as measured 1) in the Colorado River at the Northerly International Boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) the 242 Well Field near San Luis, Arizona.

During 1991, other waters arrived at the Mexican points of diversion and amounted to 25,746 thousand cubic metres. These waters consisted mainly of excess waters released from reservoirs on the Colorado River. A maximum instantaneous flow of 89.5 cubic metres per second occurred in the Colorado River at the northerly boundary station on April 1.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 26,667.8 million cubic metres, 76% of the usable capacity of 35,263.2 million cubic metres. The greater part (23,791.4 million cubic metres) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1991 due to drought or accident to the irrigation system.

The total reported area irrigated from waters of the Colorado River below Imperial Dam in 1991 was 487,103 hectares; 287,556 hectares in the United States and 199,547 hectares in Mexico. An estimated 34% of the total hectares in Mexico is served by pumping from ground water.

TIJUANA RIVER BASIN

During 1991, the temperatures at Barrett Dam, California (elevation 533.40 metres) in the upper portion of the basin in the United States averaged 17.6 degrees Celsius, 1.2 degrees above the 61-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 1349.96 metres), the recorded temperatures during the year averaged 15 degrees Celsius, equal to the long-term average; and at Rodriguez Dam, Baja California (elevation 139.90 metres), the recorded temperatures averaged 18 degrees Celsius, equal to the normal for many years.

At Barrett Dam in the upper portion of the basin in the United States, the recorded precipitation was 551 millimetres, 123% of normal; and at Chula Vista near the lower end of the basin, 234 millimetres, or 95% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico was 616 millimetres, approximately 123% of the normal during the 28-year period; and at Rodriguez Dam in the lower portion of the basin in Mexico, 319 millimetres, 143% of the 53-year average.

Runoff above Barrett & Rodriguez Reservoirs during 1991 averaged more than 111% of normal. Above Morena Reservoir, the runoff was 6,338 thousand cubic metres, or about 50% of the 55-year 1937-1991 mean of 12,657 thousand cubic metres. Above Barrett Reservoir the runoff was 12,596 thousand cubic metres, or about 85% of the 55-year 1937-1991 mean of 14,877 thousand cubic metres. At Rodriguez Reservoir, the runoff was 35,189 thousand cubic metres, or about 124% of the 54-year mean of 28,302 thousand cubic metres.

The flow of the Tijuana River at the international boundary was 36,358 thousand cubic metres during 1991.

WHITEWATER DRAW

During 1991, the average annual temperature over the watershed was 0.4 degree Celsius above normal, while the annual precipitation was 141% of normal. Runoff for the year at the gaging station near Douglas, Arizona, was 405 thousand cubic metres, or about 6% of average.

GENERAL HYDROLOGIC CONDITIONS FOR 1991

SAN PEDRO RIVER

During 1991, the average annual temperature was 0.6 degree Celsius below normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 93% of the 1961–1991 mean of 528 millimetres. The stream flow at the international boundary was 7,896 thousand cubic metres, 29% the 1951–1991 average.

SANTA CRUZ RIVER

During 1991, the average annual temperature over the watershed was slightly above normal, and the annual precipitation was about 121% of the 53–year 1939–1991 mean. Runoff measured at the Nogales gaging station, where the stream re–enters the United States, was 26,495 thousand cubic metres. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, 600 thousand cubic metres. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 25,895 thousand cubic metres from the loop of the river lying in Mexico, or approximately 98% of the flow reaching the Nogales station.

ALAMO AND NEW RIVERS

During 1991, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 22.6 degrees Celsius, 0.2 degree above normal; and over the drainage area of the New River as recorded at Mexicali, Baja California, it was 23 degrees, which equaled the 66–year average.

At El Centro, the precipitation was 99 millimetres, about 148% of the 61–year average; and in Mexicali, the annual precipitation was 93 millimetres, 119% of the 66–year average. The total flow of the New River at the international boundary in 1991 was 161,317 thousand cubic metres, which was about 118% of the 1943–1991 average.

SALTON SEA

During 1991, the average annual temperature around the Salton Sea was 0.5 degree Celsius below the long–term average, while the annual precipitation recorded at Brawley, California was approximately 189% of the long–term mean of 132 millimetres. The water surface of the Salton Sea remained about the same during the year. The maximum stage, 69.43 metres below mean sea level, was recorded on April 4 - May 30, inclusive. The minimum stage, 69.71 metres below mean sea level, was recorded on January 1–3 & October 31–December 15, inclusive.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 152 metres upstream from railroad culvert and 1.6 kilometres northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 61.0 metres downstream from the spillway structure, and thence into the Colorado River on the right bank, 305 metres upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometres upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1991.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 15,789,000 m3. Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 24,904,000 m3, 1916; minimum annual flow 11,003,000 m3, 1913.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.01	1.61	1.73	1.70	1.84	2.29	2.41	1.81	1.84	2.44	2.52	2.18
2	1.81	1.76	1.44	1.67	1.87	2.44	2.41	1.98	1.90	2.46	2.46	2.29
3	1.87	2.01	1.42	1.61	1.93	2.07	2.29	1.95	1.78	2.32	2.55	2.27
4	2.18	1.61	1.76	1.70	1.95	2.15	2.29	1.93	1.76	2.32	2.75	2.27
5	2.21	1.61	1.98	1.64	2.04	2.04	2.38	1.87	1.78	2.32	2.72	2.27
6	1.87	1.56	2.27	1.64	2.04	2.12	2.38	1.76	1.81	2.35	2.55	2.27
7	1.78	1.73	1.93	1.67	2.12	2.21	2.32	1.76	1.98	2.49	2.55	2.27
8	1.90	1.59	1.90	1.70	2.04	2.27	2.24	1.76	1.93	2.49	2.55	2.27
9	2.01	1.87	1.87	1.47	2.01	2.52	2.24	1.76	1.84	2.44	2.55	2.35
10	1.98	1.67	1.81	1.47	2.04	2.38	2.18	1.73	1.81	2.55	2.61	2.24
11	1.84	1.61	1.95	1.50	2.01	2.21	2.15	1.81	1.81	2.52	2.58	2.52
12	2.27	1.87	2.01	1.53	2.15	2.15	2.10	1.81	1.87	2.66	2.55	1.98
13	2.10	1.73	1.84	1.56	2.21	2.18	2.12	1.81	1.84	2.63	2.61	1.93
14	2.21	1.59	1.81	1.84	2.27	2.15	2.15	1.70	2.04	2.75	2.63	1.98
15	1.93	1.73	1.87	1.84	2.07	2.12	2.15	1.70	2.01	2.80	2.61	1.90
16	1.90	1.59	2.01	1.84	2.04	2.15	2.04	1.90	2.04	2.58	2.49	1.93
17	1.95	1.78	2.35	1.73	2.27	2.18	2.01	1.81	2.07	2.52	2.52	2.29
18	2.21	1.61	2.18	1.81	2.07	2.12	2.04	1.76	2.18	2.55	2.46	2.32
19	2.27	1.53	2.07	1.81	2.12	2.15	2.04	1.59	2.15	2.52	2.49	2.21
20	2.10	1.56	1.84	1.81	2.21	2.32	2.10	1.59	2.12	2.61	2.32	1.98
21	2.10	1.56	1.84	1.78	2.12	2.35	2.38	1.61	2.15	3.17	2.24	2.01
22	2.10	1.56	1.73	1.84	2.10	2.38	2.38	1.76	2.15	4.67	2.29	1.95
23	2.04	1.50	1.84	1.87	2.07	2.35	1.95	1.64	2.27	2.61	2.29	2.04
24	1.93	1.56	1.87	1.90	2.15	2.41	1.93	1.61	2.18	2.61	2.32	2.24
25	2.04	1.87	1.84	1.84	2.24	2.46	1.93	1.67	2.24	2.55	2.49	2.15
26	1.95	1.70	1.93	1.81	2.18	2.49	1.87	1.59	2.29	2.55	2.75	1.93
27	2.07	1.73	1.93	1.84	2.07	2.35	1.93	1.59	2.41	2.97	2.18	1.93
28	2.49	1.73	2.07	1.98	2.29	2.32	1.87	1.61	2.29	2.61	2.12	2.10
29	2.78		2.18	1.93	2.07	2.38	1.76	1.64	2.35	2.52	2.12	2.10
30	2.49		2.12	1.84	2.10	2.46	1.78	1.70	2.32	2.52	2.24	2.07
31	1.70		2.32		2.18		1.84	1.70		2.49		1.98
Sum	64.09	46.83	59.71	52.17	64.87	68.17	65.66	53.91	61.21	81.59	74.11	66.22

Current Year 1991 | Period 1937–1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
			ϕ High		ϕ Low			Total	Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			29	2.78	31	1.70	2.07	5,537	4,000	5,896	711
Feb.			3	2.01	23	1.50	1.67	4,046	3,735	5,493	456
Mar.			17	2.35	3	1.42	1.93	5,159	4,607	6,476	1,005
April			28	1.98	! 9	1.47	1.74	4,507	4,600	6,476	940
May			28	2.29	1	1.84	2.09	5,605	4,741	6,895	804
June			9	2.52	5	2.04	2.27	5,890	4,580	6,883	717
July			! 1	2.41	29	1.76	2.12	5,673	4,897	8,079	662
Aug.			2	1.98	!19	1.59	1.74	4,658	4,905	8,400	698
Sept.			27	2.41	4	1.76	2.04	5,289	4,642	7,672	721
Oct.			22	4.67	! 3	2.32	2.63	7,049	4,804	7,080	843
Nov.			! 4	2.75	!28	2.12	2.47	6,403	4,477	6,772	806
Dec.			11	2.52	15	1.90	2.14	5,721	4,287	6,118	783
Yearly				4.67		1.42	2.08	65,537	54,275	78,573	10,410

ϕ Mean daily ! And other days

09-5250.00 YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 501 metres upstream from the intake of the Colorado River siphon, and 5.1 kilometres downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 305 metres upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometres upstream from the northerly international land boundary.
RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1991.
REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal.
EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 367,333,000 m3; maximum annual flow, 1,127,040,000 m3, 1932; minimum annual flow, 141,728,000 m3, 1917. Since 1935: Maximum mean daily discharge, 57.2 m3/sec, December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	23.7	5.89	11.4	18.0	4.84	23.2	13.5	8.78	19.8	9.77	9.35	11.8
2	24.5	10.6	9.71	22.7	5.89	24.7	22.9	6.80	17.8	8.47	7.48	16.1
3	24.5	26.0	11.4	19.9	6.63	1.90	7.99	7.79	19.4	8.64	9.15	16.1
4	24.3	30.6	23.7	9.97	8.16	3.23	13.5	9.01	17.3	6.85	9.80	15.3
5	22.5	17.6	32.3	8.01	21.7	3.65	12.9	13.5	18.4	6.23	11.5	14.2
6	22.9	4.96	31.2	8.47	19.4	1.93	12.3	13.0	7.67	5.52	12.1	15.2
7	22.1	4.16	13.2	10.2	16.4	4.56	15.5	12.8	2.04	7.02	11.1	15.2
8	22.1	4.56	18.4	7.42	14.2	3.96	16.1	13.8	36.2	6.40	10.4	14.8
9	22.3	5.32	14.4	5.69	3.99	7.48	14.7	13.3	9.40	6.60	10.9	16.8
10	22.1	5.49	17.4	4.96	1.78	12.3	11.1	12.3	9.15	6.15	11.2	17.6
11	22.3	4.16	18.1	4.33	3.43	13.4	9.06	15.5	15.2	6.17	12.0	11.8
12	23.6	4.19	11.6	4.13	11.8	14.5	12.4	9.88	15.5	6.09	12.9	7.02
13	24.1	5.98	10.1	10.7	28.6	13.8	15.3	15.6	15.2	5.89	12.2	9.97
14	18.1	5.61	9.94	15.3	21.7	12.4	18.0	12.3	15.3	6.32	12.3	16.2
15	16.9	4.96	10.6	16.6	15.6	13.8	16.9	14.2	15.4	5.35	11.5	10.5
16	24.0	5.38	16.6	15.1	13.5	12.4	16.8	14.4	16.9	6.91	11.2	13.4
17	24.9	5.24	22.9	14.2	13.3	15.7	15.1	15.1	17.9	7.00	11.2	23.5
18	25.8	5.58	23.2	6.57	14.5	9.43	15.4	18.0	18.7	6.00	11.9	25.5
19	26.7	6.68	20.8	4.70	15.0	9.18	16.6	12.3	18.8	7.08	12.1	24.7
20	26.4	7.42	18.5	8.50	16.9	11.6	18.9	12.5	19.5	6.00	12.7	19.4
21	26.8	7.08	13.7	12.9	18.5	15.9	20.9	13.2	19.2	6.54	10.4	20.7
22	27.2	6.80	13.5	11.7	18.0	15.1	17.9	11.6	21.0	3.79	7.00	21.6
23	27.8	7.00	16.5	8.13	16.4	18.0	8.95	11.1	21.0	4.79	10.1	22.6
24	25.4	6.17	19.1	12.0	15.5	12.9	6.57	11.0	20.6	5.86	12.4	23.2
25	25.3	5.92	19.2	6.66	15.6	11.1	6.85	11.0	19.7	6.09	13.7	22.2
26	25.4	7.05	15.8	8.38	13.9	10.2	9.15	10.3	19.0	6.85	12.7	22.8
27	25.0	3.82	16.7	12.3	14.8	10.7	9.43	9.06	18.1	7.42	15.2	23.8
28	30.6	5.61	19.4	14.9	15.7	14.7	.42	9.52	18.4	10.8	16.1	24.0
29	30.6		20.5	11.4	15.1	17.3	.42	11.4	17.8	8.52	15.3	24.1
30	28.3		20.3	9.20	17.0	18.5	.42	32.3	17.0	7.62	15.2	24.7
31	4.79		24.0		20.2		7.84	23.4		8.33		22.2
Sum	740.99	219.83	544.15	323.02	438.02	357.52	383.80	404.74	517.36	211.07	351.08	566.99

Current Year 1991 | Period 1935–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	ø High	Day	ø Low		Total	Average	Maximum	Minimum
Jan.			!28	30.6	31	4.79	23.9	64,022	56,022	136,546	550
Feb.			4	30.6	27	3.82	7.85	18,993	48,250	109,952	444
Mar.			5	32.3	2	9.71	17.6	47,015	48,237	111,248	440
April			2	22.7	12	4.13	10.8	27,909	48,071	106,795	402
May			13	28.6	10	1.78	14.1	37,845	57,556	108,892	411
June			2	24.7	3	1.90	11.9	30,890	50,342	107,263	422
July			2	22.9	!28	.42	12.4	33,160	47,349	112,518	455
Aug.			30	32.3	2	6.80	13.1	34,970	48,140	110,878	455
Sept.			8	36.2	7	2.04	17.2	44,700	53,063	103,193	440
Oct.			28	10.8	22	3.79	6.81	18,236	48,784	111,075	699
Nov.			28	16.1	22	7.00	11.7	30,333	48,713	125,198	882
Dec.			18	25.5	12	7.02	18.3	48,988	55,179	134,203	570
Yearly				36.2		0.42	13.9	437,061	609,706	1,286,335	8,226

ø Mean daily ! And other days

09-5211.00 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 305 metres downstream from the mouth of the Yuma Main Canal Wasteway, 1.0 kilometres downstream from the abandoned gaging station on the Colorado River at Yuma, 8.4 kilometres downstream from the mouth of the Gila River, 31.5 kilometres downstream from Imperial Dam, and 10.3 kilometres upstream from the northerly international boundary. Zero of the gage is 31.09 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1991. Records from January 1951 through September 1963 deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4" and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	37.4	24.9	26.8	55.8	23.4	38.8	37.4	25.2	34.3	25.8	27.8	27.2
2	38.2	34.6	49.8	45.3	24.2	39.6	34.3	24.2	32.6	25.0	26.4	30.3
3	39.4	47.6	57.5	36.0	24.9	18.6	30.6	26.5	33.7	25.2	25.6	30.0
4	39.6	48.1	59.2	35.1	24.8	19.9	30.6	28.1	32.6	23.3	27.4	30.6
5	40.5	33.4	62.0	35.7	37.1	21.2	29.7	31.7	35.1	23.9	28.9	29.7
6	41.1	21.2	75.6	27.7	35.4	20.7	29.5	30.0	35.4	24.1	28.3	30.3
7	39.4	20.7	42.5	29.7	32.0	22.2	32.6	29.5	47.3	24.6	28.9	30.0
8	39.9	20.4	33.1	28.6	32.0	22.6	32.3	29.7	78.7	23.5	28.9	30.0
9	39.9	20.2	29.7	25.8	31.2	24.4	30.6	29.7	37.1	23.3	27.5	32.0
10	41.1	21.3	34.0	24.2	23.0	28.6	26.2	28.3	34.3	22.9	28.9	32.6
11	40.5	20.6	37.4	24.0	21.4	28.9	24.7	31.2	34.8	23.6	29.2	48.7
12	45.3	19.8	32.9	23.3	26.1	29.5	27.8	32.0	32.3	23.3	29.2	62.0
13	44.7	21.0	38.2	28.3	44.7	29.2	31.4	32.3	31.4	23.0	28.6	35.1
14	52.4	20.4	28.9	33.7	38.5	28.6	34.6	30.0	32.9	23.3	29.7	33.1
15	36.0	20.2	27.0	35.1	32.9	27.4	32.9	27.3	33.4	23.4	28.1	34.6
16	40.8	20.5	32.3	33.1	32.6	29.7	32.0	28.9	34.6	23.8	27.5	35.1
17	41.3	20.6	38.8	32.3	32.6	31.4	30.9	32.3	33.7	24.2	27.8	36.5
18	41.3	20.4	39.4	23.4	32.6	23.3	31.2	32.9	32.9	22.5	28.3	36.8
19	42.5	20.8	37.7	20.8	32.3	26.1	33.4	24.8	33.7	23.1	28.2	36.0
20	42.2	21.4	36.5	23.3	32.3	27.5	36.0	24.8	32.6	25.0	28.0	35.7
21	42.2	21.0	39.6	28.9	32.0	32.9	37.9	25.1	35.1	24.8	26.4	35.1
22	42.2	20.6	31.2	27.4	33.4	32.6	34.3	25.3	35.4	26.1	26.0	36.0
23	42.5	21.0	33.7	23.6	32.6	35.4	25.7	24.4	34.6	24.2	26.7	35.7
24	41.1	20.6	35.7	22.3	32.6	30.6	22.7	24.4	33.4	24.6	28.0	37.1
25	41.3	20.5	36.0	22.1	32.0	29.2	22.4	25.4	33.1	24.3	27.9	36.5
26	41.3	21.9	34.0	22.7	31.2	28.3	23.5	25.0	33.7	23.8	27.6	36.5
27	42.5	21.1	34.0	27.4	32.0	29.5	26.6	23.9	33.4	24.6	28.9	36.5
28	47.3	21.7	36.8	30.3	32.9	35.4	16.5	25.3	33.4	27.2	30.9	37.4
29	48.1		41.3	26.8	31.4	37.1	16.3	26.1	32.9	26.9	28.9	37.4
30	47.0		39.9	25.0	32.3	39.4	16.6	46.7	32.9	27.0	30.6	37.9
31	24.7		45.3		34.6		18.8	37.9		26.3		38.8
Sum	1,283.7	666.5	1,226.8	877.7	971.0	868.6	890.0	888.9	1,071.3	756.6	845.1	1,101.2

Current Year 1991 | Period 1951–1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme–Cubic Metres per Second Day	High	Day	Low	Average	Volume–Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	3.15	2.53	14	60.6	31	23.5	41.4	110,912	295,921	1,317,479	36,828
Feb.	2.95	2.40	! 3	49.6	5	17.8	23.8	57,586	223,380	1,228,424	41,679
Mar.	3.45	2.58	6	82.7	1	24.9	39.6	105,996	228,292	1,323,857	42,683
April	3.29	2.46	1	71.4	18	19.1	29.3	75,833	211,669	1,039,836	41,552
May	2.94	2.46	13	47.3	10	19.1	31.3	83,894	223,933	1,065,554	56,582
June	2.90	2.44	21	43.3	3	17.7	29.0	75,047	227,648	1,113,679	41,761
July	2.83	2.41	1	39.4	129	16.0	28.7	76,896	264,223	2,013,773	42,448
Aug.	3.03	2.53	30	50.7	1	20.8	28.7	76,801	270,096	2,073,958	41,457
Sept.	3.59	2.59	8	93.7	30	24.8	35.7	92,560	239,330	1,669,785	53,264
Oct.	2.74	2.50	22	34.0	4	20.3	24.4	65,370	204,495	1,789,911	43,129
Nov.	2.77	2.51	30	32.6	2	20.3	28.2	73,017	207,220	1,292,035	42,965
Dec.	3.33	2.65	12	71.4	1	25.1	35.5	95,144	243,244	1,374,775	40,733
Yearly	3.59	2.40		93.7		16.0	31.4	989,056	2,839,451	13,065,596	633,707

! And other days

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY
AT YUMA, ARIZONA – STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.81	2.55	2.62	3.06	2.55	2.83	2.79	2.61	2.76	2.61	2.65	2.68
2	2.82	2.70	2.97	2.90	2.57	2.85	2.73	2.60	2.72	2.59	2.62	2.73
3	2.83	2.92	3.09	2.76	2.58	2.47	2.67	2.63	2.75	2.60	2.62	2.73
4	2.83	2.93	3.11	2.74	2.58	2.50	2.67	2.66	2.73	2.56	2.64	2.74
5	2.85	2.68	3.15	2.75	2.77	2.53	2.66	2.72	2.77	2.57	2.66	2.72
6	2.86	2.47	3.35	2.62	2.75	2.52	2.66	2.69	2.78	2.58	2.66	2.73
7	2.83	2.47	2.87	2.65	2.69	2.55	2.71	2.68	2.97	2.58	2.67	2.72
8	2.83	2.46	2.72	2.64	2.69	2.56	2.71	2.69	3.41	2.57	2.67	2.73
9	2.83	2.46	2.66	2.59	2.68	2.59	2.68	2.69	2.80	2.56	2.65	2.76
10	2.85	2.49	2.73	2.57	2.55	2.66	2.61	2.67	2.75	2.56	2.67	2.76
11	2.84	2.47	2.78	2.56	2.52	2.66	2.59	2.71	2.76	2.57	2.68	3.02
12	2.92	2.45	2.71	2.55	2.60	2.67	2.64	2.72	2.72	2.57	2.68	3.21
13	2.91	2.49	2.80	2.63	2.91	2.66	2.69	2.73	2.71	2.56	2.67	2.80
14	3.03	2.47	2.65	2.72	2.81	2.65	2.75	2.69	2.73	2.57	2.69	2.77
15	2.76	2.47	2.62	2.74	2.71	2.63	2.72	2.65	2.74	2.57	2.67	2.80
16	2.83	2.48	2.70	2.71	2.71	2.67	2.71	2.67	2.76	2.58	2.66	2.80
17	2.84	2.48	2.80	2.69	2.71	2.70	2.69	2.72	2.74	2.58	2.67	2.83
18	2.84	2.48	2.82	2.54	2.71	2.56	2.70	2.74	2.72	2.55	2.68	2.83
19	2.86	2.49	2.79	2.50	2.71	2.61	2.73	2.61	2.74	2.57	2.68	2.82
20	2.85	2.51	2.77	2.55	2.71	2.63	2.77	2.61	2.72	2.60	2.68	2.81
21	2.85	2.50	2.82	2.64	2.71	2.72	2.81	2.61	2.76	2.59	2.65	2.80
22	2.85	2.49	2.68	2.62	2.73	2.71	2.75	2.62	2.77	2.62	2.65	2.82
23	2.85	2.50	2.72	2.56	2.72	2.76	2.61	2.60	2.75	2.58	2.66	2.81
24	2.83	2.49	2.76	2.55	2.72	2.68	2.56	2.60	2.73	2.59	2.68	2.83
25	2.83	2.49	2.76	2.53	2.71	2.65	2.56	2.62	2.72	2.59	2.68	2.83
26	2.83	2.52	2.72	2.54	2.70	2.64	2.58	2.61	2.74	2.58	2.68	2.82
27	2.84	2.51	2.72	2.62	2.71	2.65	2.62	2.59	2.73	2.59	2.70	2.83
28	2.93	2.52	2.77	2.67	2.73	2.75	2.42	2.61	2.73	2.64	2.73	2.84
29	2.94		2.85	2.61	2.70	2.78	2.42	2.62	2.72	2.63	2.71	2.83
30	2.92		2.81	2.58	2.72	2.82	2.43	2.97	2.72	2.63	2.73	2.85
31	2.55		2.91		2.76		2.47	2.82		2.62		2.86
Avg.	2.85	2.53	2.81	2.65	2.69	2.66	2.65	2.67	2.77	2.59	2.67	2.81

09-5302.00 YUMA MESA OUTLET DRAIN
TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.5 kilometre from outlet to Colorado River, 0.8 kilometre west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 2.7 kilometres downstream from the mouth of Yuma Main Canal Wasteway.
RECORDS: Records are furnished by U. S. Geological Survey. Records available: July 1970 through 1991. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.
REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.96	0.96	0.25	0.42	0.68	0	0.62	0.74	1.22	1.22	1.22	1.22
2	.96	.96	0	.23	.68	0	.54	.74	1.22	1.22	1.22	1.22
3	.96	.96	0	.62	.68	0	.57	.74	.85	1.22	1.22	1.22
4	.96	.96	0	.82	.68	.34	.62	.74	.91	1.22	1.22	1.22
5	.96	.85	0	.82	.68	.48	.17	.74	.45	1.22	1.22	1.22
6	.96	.82	0	.82	.68	.48	0	.74	0	1.22	1.22	1.22
7	.96	.54	0	.82	.68	.48	0	.74	0	1.22	1.22	1.22
8	.96	.23	.28	.71	.68	.48	0	.74	0	1.22	1.22	1.22
9	.96	.14	.45	.68	.68	.48	0	.74	0	1.22	1.22	1.22
10	.96	.11	.45	.68	.68	.48	0	.74	0	1.22	1.22	.40
11	.96	.59	.45	.68	.68	.20	0	.74	0	1.22	1.22	0
12	.96	.82	.45	.68	.68	.45	.31	.74	.20	1.22	1.22	0
13	.96	.82	.51	.68	.68	.68	.62	.62	.68	1.22	1.22	0
14	.96	.82	.57	.68	.68	.68	.62	.74	.82	1.22	1.22	0
15	.79	.82	.57	.68	.68	.68	.62	.88	.82	1.22	1.22	0
16	.93	.82	.57	.68	.68	.68	.62	.34	1.05	1.16	1.22	0
17	.88	.82	.57	.68	.68	.68	.62	0	1.22	1.22	1.22	0
18	.96	.82	.57	.68	.68	.68	.62	0	1.22	1.22	1.22	0
19	.96	.82	.51	.68	.68	.68	.62	0	1.22	1.22	1.16	.82
20	.96	.82	.57	.68	.68	.68	.62	.51	1.22	1.22	1.08	1.22
21	.96	.76	.57	.68	.68	.68	.62	.85	1.22	1.22	1.02	1.22
22	.96	.71	.57	.68	.62	.68	.62	.82	1.22	1.22	1.02	1.22
23	.96	.71	.57	.59	.57	.68	.68	.88	1.22	1.22	1.02	1.22
24	.96	.71	.57	.62	.57	.68	.74	.88	1.22	1.22	1.02	1.22
25	.96	.71	.57	.68	.57	.68	.65	.88	1.22	1.22	1.10	1.22
26	.96	.71	.57	.68	.57	.68	.59	.85	1.22	1.22	1.16	1.22
27	.96	.71	.74	.68	.57	.59	.59	.82	1.22	1.22	1.19	1.22
28	.96	.71	.82	.68	.57	.68	.59	.79	1.22	1.22	1.22	1.22
29	.96		.82	.68	.57	.68	.59	.96	1.22	1.22	1.22	1.22
30	.96		.82	.68	.57	.68	.68	1.16	1.22	1.22	1.22	1.16
31	.96		.82		.40		.74	1.16		1.22		1.13
Sum	29.48	20.23	14.21	20.07	19.86	16.02	14.88	22.02	25.30	37.76	35.39	26.69

Current Year 1991 | Period 1971–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			! 1	0.96	15	0.79	0.95	2,547	2,866	7,204	0
Feb.			! 1	.96	10	.11	.72	1,748	2,755	5,958	0
Mar.			!28	.82	! 2	0	.46	1,228	3,157	6,698	4.9
April			! 4	.82	2	.23	.67	1,734	3,030	6,315	299
May			! 1	.68	31	.40	.64	1,716	2,962	6,085	0
June			!13	.68	! 1	0	.53	1,384	2,640	5,955	0
July			!24	.74	! 6	0	.48	1,286	2,932	6,796	854
Aug.			!30	1.16	!17	0	.71	1,903	3,133	7,401	222
Sept.			! 1	1.22	! 6	0	.84	2,186	3,201	7,253	0
Oct.			! 1	1.22	16	1.16	1.22	3,262	3,153	6,611	194
Nov.			! 1	1.22	!21	1.02	1.18	3,058	3,191	6,525	386
Dec.			! 1	1.22	!11	0	.86	2,306	3,426	7,364	0
Yearly				1.22		0	0.77	24,358	36,446	72,381	2,162

ϕ Mean daily ! And other days

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 6.4 kilometres downstream from Colorado River below Yuma Main Canal Wasteway, and 4.0 kilometres upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."
RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 1991.
REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 975 metres upstream, is affected by backwater from the river during ordinary high stages.
EXTREMES: Mean daily discharge: Maximum, 0.74 m3/sec on October 30, 1990; minimum no flow several days in February 1966.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.27	0.18	0.20	0.22	0.13	0.18	0.16	0.28	0.22	0.37	0.45	0.42
2	.28	.18	.21	.20	.12	.17	.16	.31	.21	.37	.42	.40
3	.31	.18	.21	.18	.17	.16	.16	.27	.21	.34	.40	.34
4	.34	.18	.22	.16	.21	.17	.17	.25	.22	.34	.34	.31
5	.16	.18	.18	.14	.21	.17	.17	.23	.24	.31	.37	.28
6	.16	.18	.14	.15	.20	.18	.18	.23	.25	.31	.37	.26
7	.16	.18	.10	.15	.20	.19	.18	.23	.27	.31	.37	.28
8	.16	.18	.10	.15	.20	.19	.18	.23	.28	.28	.40	.28
9	.16	.18	.10	.16	.20	.20	.19	.23	.31	.31	.40	.31
10	.16	.18	.10	.16	.20	.21	.19	.23	.28	.31	.40	.34
11	.16	.18	.10	.16	.19	.22	.20	.23	.28	.31	.42	.37
12	.16	.18	.10	.16	.19	.22	.20	.24	.28	.34	.42	.40
13	.16	.18	.10	.16	.19	.22	.20	.24	.28	.34	.42	.37
14	.17	.18	.10	.17	.18	.21	.20	.24	.28	.34	.45	.37
15	.17	.18	.10	.17	.18	.21	.21	.24	.28	.37	.45	.37
16	.17	.18	.10	.17	.18	.20	.21	.24	.28	.37	.45	.34
17	.18	.18	.10	.18	.18	.20	.21	.24	.28	.40	.45	.34
18	.18	.18	.10	.18	.18	.19	.22	.24	.28	.40	.48	.34
19	.18	.18	.48	.17	.17	.19	.22	.24	.28	.40	.48	.34
20	.18	.18	.45	.17	.17	.18	.22	.24	.28	.42	.48	.34
21	.18	.18	.45	.17	.17	.18	.22	.25	.28	.42	.51	.31
22	.19	.18	.42	.16	.17	.18	.23	.25	.28	.42	.51	.31
23	.19	.19	.40	.16	.18	.17	.23	.24	.31	.45	.51	.31
24	.19	.19	.40	.16	.19	.17	.23	.24	.31	.45	.51	.31
25	.19	.19	.37	.15	.20	.16	.24	.24	.31	.45	.54	.28
26	.19	.20	.34	.15	.20	.16	.25	.24	.34	.48	.54	.28
27	.19	.20	.31	.14	.21	.15	.25	.23	.34	.48	.54	.27
28	.19	.20	.31	.14	.22	.15	.26	.23	.34	.48	.51	.26
29	.19		.28	.14	.22	.15	.27	.22	.37	.51	.48	.25
30	.19		.26	.13	.21	.15	.28	.22	.37	.51	.45	.25
31	.18		.24		.20		.28	.22		.48		.24
Sum	5.94	5.13	7.07	4.86	5.82	5.48	6.57	7.46	8.54	12.07	13.52	9.87

Current Year 1991 | Period 1948–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			4	0.34	! 5	0.16	0.19	513	437	1,109	48.5
Feb.			!26	.20	! 1	.18	.18	443	376	920	50.0
Mar.			19	.48	! 7	.10	.23	611	441	1,052	77.3
April			1	.22	30	.13	.16	420	446	1,233	82.4
May			!28	.22	2	.12	.19	503	464	1,192	71.9
June			!11	.22	!27	.15	.18	473	484	1,270	83.1
July			!30	.28	! 1	.16	.21	568	555	1,554	89.8
Aug.			2	.31	!29	.22	.24	645	616	1,665	91.0
Sept.			!29	.37	! 2	.21	.28	738	607	1,690	66.1
Oct.			!29	.51	8	.28	.39	1,043	646	1,505	68.2
Nov.			!25	.54	4	.34	.45	1,168	589	1,530	71.2
Dec.			1	.42	31	.24	.32	853	512	12,295	52.1
Yearly				0.54		0.10	0.25	7,978	6,173	15,331	955

ϕ Mean daily ! And other days

09-5270.00 PILOT KNOB POWER PLANT AND WASTEWAY NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 33.5 kilometres downstream from the intake at Imperial Dam, 9.7 kilometres west of Yuma, about 1.6 kilometres north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about 1.6 kilometres upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 168 metres upstream from wasteway gates and 549 metres from the entrance to the power plant. Datum of gage is 45.72 metres above mean sea level. Tailrace gage is on left bank, 207 metres downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 45.07 metres, U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey. Records available: July 1944 through 1991. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950 in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938, and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957, and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 281 m3/sec on October 6, 1985; minimum daily discharge, no flow during long periods.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	28.1	29.2	28.3	52.4	0	31.7	41.6	0	0	0	0
2	0	22.5	20.6	30.9	51.3	0	35.1	36.5	0	0	0	0
3	28.3	0	0	43.0	49.8	28.6	40.2	29.7	0	0	0	0
4	0	0	0	43.3	47.0	28.3	39.9	28.3	0	0	0	0
5	15.6	12.8	0	41.9	30.9	28.3	40.2	28.3	0	0	0	0
6	40.2	32.6	0	51.5	28.3	28.3	41.6	28.3	0	0	0	0
7	30.9	29.2	20.6	50.4	28.3	28.3	39.6	28.3	0	0	0	0
8	40.2	29.2	30.0	56.4	28.3	28.3	40.5	29.2	1.76	0	0	0
9	33.7	29.2	36.8	57.8	29.5	28.3	39.6	30.0	0	0	0	0
10	0	29.2	30.9	58.3	39.1	28.3	43.0	30.3	0	0	0	0
11	0	29.2	35.1	59.5	36.8	28.9	45.3	29.2	0	0	0	0
12	0	28.9	38.5	60.6	28.9	28.3	43.9	28.6	0	0	0	0
13	0	29.2	30.9	57.2	0	28.6	40.8	28.3	0	0	0	0
14	18.0	28.9	40.2	50.7	0	28.3	34.6	28.9	0	0	0	0
15	16.3	28.9	44.7	51.0	0	29.5	34.0	34.3	0	0	0	0
16	0	28.9	39.6	53.0	0	28.3	37.4	34.3	0	0	0	0
17	0	28.9	30.9	54.4	0	31.4	37.7	28.9	0	0	0	0
18	0	28.9	36.8	62.9	0	48.1	38.2	28.9	0	0	0	0
19	0	28.9	38.8	67.1	0	49.0	34.8	28.3	0	0	0	0
20	0	28.9	42.5	64.9	0	46.4	33.7	28.3	0	0	0	0
21	0	28.9	36.8	58.6	0	41.1	29.5	28.3	0	0	0	0
22	0	28.9	49.6	53.0	0	41.9	35.1	28.3	0	0	0	0
23	0	28.9	45.6	57.8	0	36.5	43.3	28.3	0	0	0	0
24	0	28.9	43.0	59.5	0	47.3	48.1	28.3	0	0	0	0
25	0	28.9	43.9	61.7	0	49.8	48.1	28.3	0	0	0	0
26	0	28.9	43.6	60.9	0	51.0	46.7	28.3	0	0	0	0
27	0	29.2	44.2	56.1	0	51.5	41.1	28.3	0	0	0	0
28	0	29.2	41.1	52.4	0	44.2	55.8	28.3	0	0	0	0
29	0		36.2	51.5	0	41.6	62.3	28.3	0	0	0	0
30	0		38.5	52.4	0	37.1	56.6	0	0	0	0	0
31	0		30.9		0		53.2	0		0		0
Sum	223.2	734.2	999.5	1,607.0	450.6	1,015.5	1,291.6	863.2	1.76	0	0	0

Current Year 1991 | Period 1944-1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme-Cubic Metres per Second Day	ϕ High	Day	ϕ Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.			! 6	40.2	! 1	0	7.20	19,284	108,213	643,620	0
Feb.			6	32.6	! 3	0	26.2	63,435	79,739	579,127	0
Mar.			22	49.6	! 3	0	32.2	86,357	144,964	501,939	0
April			19	67.1	1	28.3	53.6	138,845	161,546	447,013	0
May			1	52.4	!13	0	14.5	38,932	75,722	454,461	0
June			27	51.5	! 1	0	33.9	87,739	121,199	501,523	0
July			29	62.3	21	29.5	41.7	111,594	174,683	512,385	0
Aug.			1	41.6	!30	0	27.8	74,580	177,192	498,782	0
Sept.			8	1.76	! 1	0	.06	152	102,424	591,679	0
Oct.			! 1	0	! 1	0	0	0	73,404	617,269	0
Nov.			! 1	0	! 1	0	0	0	69,664	609,196	0
Dec.			! 1	0	! 1	0	0	0	110,526	700,894	0
Yearly				67.1		0	19.7	620,918	1,399,276	6,000,505	0

ϕ Mean daily ! And other days

09-5220.00 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, about 10.3 kilometres downstream from Colorado River below Yuma Main Canal Wasteway, 8.0 kilometres west of Yuma, Arizona, 1.8 kilometres upstream from Morelos Diversion Structure, and about 1.6 kilometres downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 52 metres upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

RECORDS: Based on 110 current meter measurements during the year, 53 by the United States Section, 56 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 512 metres upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1991; daily discharge records available January 1, 1950 through 1991.

REMARKS: Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1991 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 7,080 m3/sec, January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 16,581,806,000 m3; maximum annual flow 31,429,325,000 m3, 1907; minimum annual flow 1,448,117,000 m3, 1934. Since January 1935: Maximum instantaneous discharge 1,150 m3/sec on August 20, 1983, minimum discharge, no flow during April 1935.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	41.3	54.9	59.2	88.1	77.3	42.5	71.4	70.8	38.8	29.5	29.5	33.4
2	41.9	57.8	70.2	83.0	77.0	45.3	70.8	65.1	36.8	27.9	28.9	36.2
3	43.0	51.5	61.5	82.4	77.0	48.7	71.9	59.8	37.7	28.3	27.1	36.2
4	43.3	52.4	63.7	82.4	74.8	50.1	71.6	59.2	36.8	26.6	28.9	36.8
5	57.8	51.8	65.7	82.7	71.4	51.8	71.1	63.4	38.2	26.9	30.6	36.0
6	81.0	54.9	75.6	82.1	68.5	51.0	71.6	62.9	39.4	27.6	30.6	36.0
7	74.8	52.4	68.0	82.4	64.3	53.2	72.2	62.0	47.0	27.8	30.9	36.0
8	82.1	51.0	65.4	87.2	63.4	54.1	72.5	62.3	74.5	27.6	30.3	35.4
9	76.5	51.3	66.0	86.7	63.4	54.9	70.8	63.4	42.5	26.5	29.7	37.9
10	46.7	52.7	67.1	85.2	63.7	59.5	71.1	62.0	37.1	26.5	30.9	37.9
11	45.3	52.7	72.2	85.2	60.3	60.3	71.1	63.4	37.1	26.9	30.9	49.3
12	51.3	51.5	73.6	86.1	56.6	60.6	73.1	64.0	36.8	26.6	31.4	65.4
13	50.1	53.2	73.1	86.7	49.6	60.0	73.3	64.0	37.4	26.5	31.2	40.5
14	75.3	52.1	71.9	86.7	43.9	59.5	72.5	63.2	37.1	26.4	31.7	37.4
15	56.1	52.1	74.2	87.8	37.4	59.5	70.5	62.3	36.8	27.2	30.9	39.1
16	46.2	51.8	73.6	88.1	37.1	59.8	72.5	62.9	37.1	27.0	30.9	38.5
17	46.2	52.4	73.3	88.4	36.8	66.0	71.6	62.0	36.2	27.7	31.2	41.1
18	46.4	51.8	77.9	88.6	36.8	72.5	71.4	66.3	36.8	26.8	32.0	41.1
19	47.6	52.4	78.2	89.5	36.5	75.3	71.4	55.8	36.2	26.8	32.3	40.8
20	47.3	53.2	81.0	89.5	36.5	74.8	71.4	56.9	36.2	29.2	31.4	41.1
21	46.7	53.0	80.4	89.5	36.5	74.5	71.4	56.9	36.5	28.9	31.2	39.9
22	47.0	53.0	81.0	83.0	37.7	75.6	72.8	57.2	36.2	31.2	30.6	41.1
23	47.3	53.2	81.6	84.4	36.5	73.3	72.2	56.1	37.1	28.2	31.7	40.8
24	46.2	52.7	81.6	83.3	36.8	78.2	72.8	56.4	37.1	28.3	32.9	42.2
25	45.9	52.7	81.8	83.8	36.5	78.4	72.5	56.9	36.8	28.3	33.1	41.9
26	45.6	53.8	80.1	84.7	35.4	79.0	72.5	56.6	37.4	27.7	33.1	41.3
27	46.2	54.4	81.6	84.7	36.0	80.1	71.4	55.5	36.8	28.2	34.0	41.1
28	52.7	54.1	81.8	84.1	37.4	80.1	71.9	56.6	36.5	30.6	36.8	42.2
29	53.2		81.6	80.1	36.0	79.9	75.6	56.4	36.0	31.2	34.8	41.9
30	53.0		81.3	79.3	35.4	78.2	74.2	50.1	36.5	30.0	36.8	42.2
31	53.8		82.1		38.2		73.9	43.0		29.5		43.0
Sum	1,637.8	1,480.8	2,306.3	2,555.7	1,534.7	1,936.7	2,235.0	1,853.4	1,163.4	868.4	946.3	1,253.7

Current Year 1991 | Period 1935-1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme-Cubic Metres per Second High Day	Extreme-Cubic Metres per Second High	Extreme-Cubic Metres per Second Low Day	Extreme-Cubic Metres per Second Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	31.90	31.16	9	93.2	1	40.5	52.8	141,506	524,729	2,027,841	39,348
Feb.	31.56	31.32	2	71.9	5	43.6	52.9	127,941	432,479	1,705,506	74,502
Mar.	31.83	31.42	21	89.5	1	55.8	74.4	199,264	451,607	1,553,817	23,930
April	31.97	31.75	1	104	2	77.6	85.2	220,812	377,513	1,322,616	0
May	31.74	31.20	1	78.5	30	33.7	49.5	132,598	370,041	1,419,735	88,077
June	31.78	31.25	27	81.6	2	39.1	64.6	167,331	375,131	1,629,906	10,485
July	31.77	31.57	1	77.6	15	63.2	72.1	193,104	400,720	2,303,937	30,097
Aug.	31.69	31.33	1	74.5	31	40.5	59.8	160,134	415,713	2,485,718	54,026
Sept.	31.88	31.14	8	84.7	30	30.9	38.8	100,518	361,074	2,286,076	66,424
Oct.	31.25	30.94	22	38.2	4	24.0	28.0	75,030	353,923	2,417,702	52,985
Nov.	31.28	31.14	30	38.2	2	23.8	31.5	81,760	391,889	1,889,976	51,070
Dec.	31.54	31.21	12	70.8	1	31.7	40.4	108,320	495,778	2,259,735	51,806
Yearly	31.97	30.94		104		23.8	54.2	1,708,318	4,950,597	19,033,104	890,696

09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY – STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.26	31.40	31.48	31.85	31.72	31.30	31.67	31.64	31.31	31.16	31.20	31.23
2	31.27	31.43	31.56	31.80	31.72	31.34	31.64	31.60	31.28	31.17	31.19	31.25
3	31.28	31.37	31.48	31.79	31.72	31.38	31.64	31.53	31.27	31.19	31.17	31.25
4	31.28	31.38	31.52	31.79	31.72	31.40	31.63	31.53	31.28	31.16	31.19	31.25
5	31.36	31.37	31.53	31.79	31.70	31.41	31.64	31.59	31.16	31.16	31.21	31.25
6	31.47	31.40	31.66	31.79	31.66	31.39	31.63	31.61	31.17	31.17	31.21	31.25
7	31.46	31.38	31.59	31.79	31.60	31.41	31.64	31.61	31.34	31.18	31.22	31.25
8	31.48	31.36	31.54	31.84	31.58	31.42	31.64	31.58	31.65	31.18	31.21	31.24
9	31.47	31.37	31.54	31.84	31.56	31.43	31.64	31.58	31.29	31.15	31.21	31.27
10	31.31	31.38	31.57	31.82	31.55	31.46	31.64	31.56	31.24	31.15	31.22	31.27
11	31.29	31.39	31.67	31.81	31.52	31.47	31.64	31.58	31.23	31.15	31.22	31.38
12	31.34	31.37	31.68	31.83	31.52	31.48	31.66	31.60	31.24	31.15	31.22	31.49
13	31.33	31.38	31.66	31.84	31.44	31.48	31.67	31.58	31.25	31.15	31.22	31.31
14	31.60	31.36	31.64	31.85	31.36	31.47	31.69	31.58	31.25	31.15	31.22	31.28
15	31.46	31.36	31.68	31.87	31.26	31.48	31.64	31.56	31.26	31.16	31.21	31.29
16	31.24	31.36	31.67	31.88	31.24	31.49	31.69	31.56	31.28	31.15	31.21	31.29
17	31.27	31.37	31.67	31.89	31.23	31.54	31.68	31.57	31.27	31.16	31.22	31.31
18	31.30	31.36	31.73	31.89	31.23	31.61	31.68	31.66	31.27	31.15	31.22	31.32
19	31.32	31.37	31.73	31.89	31.23	31.65	31.68	31.53	31.25	31.15	31.22	31.31
20	31.31	31.38	31.75	31.89	31.24	31.66	31.67	31.53	31.26	31.17	31.21	31.31
21	31.30	31.38	31.76	31.89	31.24	31.66	31.67	31.51	31.27	31.17	31.21	31.30
22	31.30	31.39	31.76	31.84	31.27	31.69	31.68	31.52	31.25	31.19	31.19	31.31
23	31.30	31.39	31.77	31.85	31.26	31.66	31.69	31.49	31.26	31.15	31.20	31.31
24	31.29	31.39	31.77	31.84	31.26	31.72	31.67	31.50	31.27	31.16	31.22	31.32
25	31.29	31.38	31.78	31.84	31.25	31.73	31.67	31.50	31.28	31.16	31.22	31.32
26	31.29	31.39	31.78	31.84	31.22	31.74	31.67	31.51	31.29	31.16	31.22	31.32
27	31.29	31.41	31.78	31.84	31.23	31.75	31.67	31.50	31.27	31.16	31.22	31.32
28	31.36	31.41	31.79	31.84	31.24	31.76	31.68	31.50	31.24	31.19	31.26	31.33
29	31.37		31.79	31.79	31.23	31.75	31.74	31.50	31.24	31.20	31.24	31.33
30	31.38		31.77	31.78	31.23	31.74	31.71	31.44	31.25	31.18	31.26	31.33
31	31.38		31.78		31.25		31.71	31.37		31.18		31.34
Avg.	31.34	31.38	31.67	31.84	31.40	31.55	31.67	31.55	31.27	31.16	31.21	31.30

09-5318.50 COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 0.8 kilometre downstream from the northerly international boundary and 1.0 kilometre upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.6 kilometre downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 35.86 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge March 1950 through 1991 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 1,127,000 m3 in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 2.25 m3/sec on June 19, 1965, at a maximum gage height of 34.79 metres (old datum); minimum instantaneous discharge, zero during parts of most months.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.01	0.14	0.04	0.01	0	0	0.07	0	0.04	0.01	0	0.26
2	.03	.16	0	.02	.05	0	.05	0	.03	.09	0	.01
3	.02	.22	0	.05	.02	.05	0	.07	0	.03	.13	0
4	.15	.08	0	.02	.07	.12	.08	.03	0	0	.01	0
5	.25	.04	0	.06	.11	.01	0	0	.03	0	0	0
6	.01	.15	0	.07	.01	.03	.07	0	.04	0	0	.08
7	0	.05	0	.08	0	.10	0	0	.02	.02	0	0
8	0	.01	0	.03	0	.19	0	0	.10	0	0	.16
9	0	.09	.06	.07	0	0	.02	0	.01	.09	.10	.15
10	0	.04	.03	.02	.01	.06	.05	0	0	.03	.15	.26
11	0	.12	.18	.08	.11	.03	.01	.02	.01	.04	.17	.04
12	0	.12	.09	.08	.01	.06	0	.03	0	.12	.06	.01
13	0	.14	.07	.06	0	.10	.05	0	0	.09	0	.01
14	0	.03	.10	.18	.02	.13	0	0	0	.05	.01	.15
15	0	.16	.10	.05	0	.07	.07	0	0	.01	.06	.01
16	0	.06	.06	.05	.19	0	.09	0	.06	0	.08	0
17	0	0	.12	.03	0	0	.04	.03	.05	.01	0	0
18	.09	0	.01	.05	0	0	.04	.02	.05	.19	.08	.02
19	.20	0	0	0	0	0	0	.02	.03	.11	.05	.11
20	.13	0	0	0	.12	.02	.16	.01	.01	.25	.04	.01
21	.06	.03	0	.03	.10	.06	0	.01	.02	.27	0	0
22	.10	.23	.01	.07	.06	.01	0	0	0	.25	0	.06
23	.03	.10	0	.04	.06	0	.01	.01	0	.01	.25	.01
24	.14	.25	0	.13	.04	0	.05	0	.02	.04	.16	0
25	.24	.13	.05	.01	.20	.01	.03	0	.06	.02	.12	0
26	.03	.06	0	.04	.01	0	.03	0	.04	.03	.14	0
27	.01	.03	.01	.03	.07	0	.05	0	.06	.07	.20	.03
28	0	.15	.14	0	.08	0	.05	.05	0	.01	.09	.02
29	0		.08	.06	0	.06	0	.04	0	.01	.07	.10
30	0		0	.03	.11	.07	0	.06	0	.07	.16	.06
31	.06		.07		.04		0	.03		.08		.23
Sum	1.56	2.59	1.22	1.45	1.49	1.18	1.02	0.43	0.68	2.00	2.13	1.79

Current Year 1991 | Period 1935-1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme-Cubic Metres per Second Day	Extreme-Cubic Metres per Second High	Day	Extreme-Cubic Metres per Second Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	0.66	0	24	1.28	! 1	0	0.05	135	189	1,127	0
Feb.	.68	0	22	1.36	! 1	0	.09	224	166	493	7.4
Mar.	.49	0	17	.82	! 1	0	.04	105	177	638	0
April	.56	0	24	1.01	! 1	0	.05	125	177	524	20.6
May	.62	0	20	1.16	! 1	0	.05	129	178	543	39.1
June	.57	0	8	1.03	! 4	0	.04	102	162	734	27.9
July	.58	0	20	1.05	! 1	0	.03	88.1	154	636	0
Aug.	.55	0	29	.97	! 1	0	.01	37.2	121	761	0
Sept.	.45	0	27	.71	! 2	0	.02	58.8	123	570	0
Oct.	.67	0	20	1.33	! 1	0	.06	173	158	604	0
Nov.	.65	0	26	1.25	! 1	0	.07	184	183	570	11.1
Dec.	.78	.01	31	1.65	! 1	0	.06	155	207	730	16.9
Yearly	0.78	0		1.65		0	0.05	1,516	1,995	5,551	787

! And other days

09-5220.21 COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.8 kilometres downstream from the northerly international boundary, and about 12.1 kilometres downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 metre below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1991.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 34.88 metres on August 18, 1983; minimum mean daily elevation above mean sea level, 30.94 metres on February 17, 1957.

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.12	31.24	31.31	31.68	31.58	31.19	31.53	31.51	31.19	31.09	31.08	31.09
2	31.13	31.27	31.38	31.65	31.58	31.22	31.51	31.46	31.16	31.09	31.07	31.11
3	31.15	31.21	31.32	31.64	31.59	31.26	31.51	31.41	31.17	31.10	31.06	31.11
4	31.14	31.22	31.38	31.64	31.59	31.28	31.50	31.40	31.19	31.07	31.07	31.12
5	31.22	31.21	31.41	31.64	31.56	31.29	31.50	31.47	31.17	31.07	31.09	31.11
6	31.28	31.24	31.53	31.64	31.53	31.28	31.49	31.50	31.18	31.08	31.09	31.11
7	31.28	31.22	31.48	31.65	31.46	31.33	31.50	31.49	31.24	31.08	31.10	31.11
8	31.30	31.20	31.42	31.71	31.44	31.34	31.51	31.47	31.55	31.08	31.09	31.11
9	31.28	31.21	31.42	31.71	31.42	31.31	31.51	31.46	31.19	31.05	31.09	31.13
10	31.16	31.22	31.45	31.69	31.42	31.32	31.51	31.44	31.14	31.05	31.10	31.13
11	31.14	31.23	31.54	31.68	31.39	31.35	31.50	31.47	31.14	31.05	31.10	31.22
12	31.19	31.20	31.56	31.70	31.40	31.35	31.52	31.49	31.14	31.05	31.10	31.33
13	31.19	31.21	31.53	31.70	31.32	31.35	31.54	31.47	31.15	31.05	31.10	31.16
14	31.43	31.20	31.51	31.71	31.24	31.35	31.56	31.46	31.16	31.05	31.10	31.13
15	31.31	31.20	31.55	31.71	31.14	31.36	31.53	31.44	31.16	31.06	31.09	31.14
16	31.10	31.20	31.54	31.72	31.12	31.37	31.56	31.44	31.18	31.06	31.09	31.14
17	31.14	31.21	31.54	31.72	31.12	31.42	31.56	31.45	31.17	31.07	31.09	31.17
18	31.16	31.20	31.59	31.72	31.12	31.46	31.56	31.54	31.18	31.06	31.09	31.17
19	31.18	31.21	31.59	31.73	31.12	31.48	31.56	31.42	31.16	31.05	31.09	31.17
20	31.17	31.22	31.62	31.73	31.13	31.51	31.54	31.43	31.17	31.07	31.09	31.17
21	31.17	31.22	31.63	31.73	31.14	31.52	31.54	31.41	31.18	31.06	31.09	31.16
22	31.17	31.23	31.63	31.68	31.16	31.54	31.56	31.41	31.16	31.08	31.07	31.17
23	31.17	31.23	31.64	31.69	31.15	31.52	31.56	31.39	31.17	31.05	31.08	31.17
24	31.16	31.23	31.64	31.67	31.15	31.57	31.55	31.40	31.17	31.06	31.09	31.18
25	31.15	31.22	31.64	31.67	31.13	31.58	31.55	31.40	31.18	31.06	31.09	31.17
26	31.15	31.23	31.64	31.67	31.11	31.59	31.55	31.41	31.19	31.05	31.09	31.17
27	31.16	31.25	31.66	31.67	31.12	31.61	31.53	31.38	31.16	31.06	31.09	31.17
28	31.21	31.25	31.66	31.67	31.13	31.61	31.54	31.39	31.14	31.08	31.12	31.18
29	31.22		31.67	31.62	31.11	31.61	31.59	31.38	31.14	31.08	31.10	31.18
30	31.22		31.64	31.61	31.12	31.60	31.58	31.33	31.15	31.07	31.12	31.18
31	31.23		31.65		31.14		31.55	31.25		31.07		31.19
Avg.	31.20	31.22	31.54	31.68	31.28	31.42	31.54	31.43	31.18	31.07	31.09	31.16

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 61 metres downstream from the intake at Morelos Dam, 410 metres upstream from the point where it joins the old Alamo Canal, 3.5 kilometres upstream from Matamoros Check, and about 1.6 kilometres south of the northerly international boundary. The zero of the gage is 0.05 metre below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limitrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1991. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoros Check, and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 1991, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 187 m3/sec, July 12 and 14, 1983; maximum mean daily gage height, 32.71 metres March 30 and 31, 1985, and March 1, 1986. Minimum daily discharge, no flow on various occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	41.3	55.1	59.2	88.1	77.3	42.5	71.4	70.8	38.9	29.5	29.5	33.7
2	41.9	57.2	65.4	83.0	77.1	45.3	70.9	65.1	36.8	28.0	28.9	36.2
3	43.1	51.8	61.5	82.5	77.1	48.8	71.9	59.8	37.7	28.3	27.2	36.2
4	43.5	52.5	63.7	82.4	74.8	50.2	71.7	59.2	36.8	26.6	28.9	36.8
5	53.9	51.9	65.7	82.8	71.5	51.8	71.1	63.4	38.3	26.9	30.6	36.0
6	64.3	55.1	74.7	82.2	68.5	51.0	71.7	62.9	39.4	27.6	30.6	36.1
7	63.0	52.4	68.0	82.5	64.3	53.4	72.2	62.0	46.1	27.8	30.9	36.0
8	58.4	51.0	65.4	87.3	63.4	54.3	72.5	62.3	43.6	27.6	30.3	35.6
9	56.2	51.3	66.0	86.7	63.4	54.9	70.8	63.4	38.5	26.5	29.8	38.1
10	46.7	52.7	67.1	85.3	63.7	59.5	71.1	62.0	37.1	26.5	31.0	38.2
11	45.3	52.8	72.4	85.3	60.4	60.3	71.1	63.5	37.1	27.0	31.0	49.3
12	51.3	51.7	73.7	86.2	56.6	60.7	73.1	64.0	36.8	26.7	31.5	61.4
13	50.1	53.4	73.1	86.7	49.6	60.1	73.4	64.0	37.4	26.6	31.2	40.5
14	61.2	52.1	72.0	86.9	43.9	59.6	72.5	63.2	37.1	26.5	31.7	37.5
15	48.7	52.3	74.3	87.8	37.4	59.6	70.6	62.3	36.8	27.2	30.9	39.1
16	41.8	51.9	73.7	88.1	37.3	59.8	72.6	62.9	37.2	27.0	31.0	38.5
17	44.1	52.4	73.5	88.4	36.8	66.0	71.7	62.0	36.3	27.7	31.2	41.1
18	46.5	51.8	77.9	88.7	36.8	72.5	71.4	66.3	36.9	27.0	32.1	41.1
19	47.8	52.4	78.2	89.5	36.5	75.3	71.4	55.8	36.3	26.9	32.3	40.9
20	47.4	53.2	81.0	89.5	36.6	74.8	71.5	56.9	36.2	29.4	31.5	41.1
21	46.8	53.0	80.4	89.5	36.6	74.5	71.4	56.9	36.6	29.2	31.2	39.9
22	47.1	53.2	81.0	83.0	37.7	75.6	72.8	57.2	36.2	31.4	30.6	41.1
23	47.3	53.4	81.6	84.4	36.6	73.3	72.2	56.1	37.1	28.2	32.0	40.8
24	46.3	52.9	81.6	83.4	36.9	78.2	72.8	56.4	37.1	28.3	33.0	42.2
25	46.1	52.8	81.9	83.8	36.7	78.4	72.5	56.9	36.9	28.3	33.2	41.9
26	45.6	53.9	80.1	84.7	35.4	79.0	72.5	56.6	37.4	27.8	33.3	41.3
27	46.2	54.4	81.6	84.7	36.1	80.1	71.4	55.5	36.9	28.3	34.2	41.1
28	52.6	54.2	82.0	84.1	37.5	80.1	72.0	56.7	36.5	30.6	36.9	42.2
29	53.2		81.6	80.2	36.0	79.9	75.6	56.4	36.0	31.2	34.9	42.0
30	53.0		81.3	79.3	35.5	78.2	74.2	50.2	36.5	30.1	37.0	42.3
31	53.9		82.2		38.3		73.9	43.1		29.5		43.3
Sum	1,534.6	1,482.8	2,301.8	2,557.0	1,536.3	1,937.7	2,235.9	1,853.8	1,128.5	870.2	948.4	1,251.5

Current Year 1991 | Period 1950-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			6	64.3	1	41.3	49.5	132,589	109,998	275,305	1,192
Feb.			2	57.2	8	51.0	53.0	128,114	108,396	251,580	11,387
Mar.			31	82.2	1	59.2	74.3	198,876	230,817	435,370	120,761
April			!19	89.5	30	79.3	85.2	220,925	260,289	404,698	189,700
May			1	77.3	26	35.4	49.6	132,736	138,696	286,174	81,665
June			!27	80.1	1	42.5	64.6	167,417	197,816	332,588	117,400
July			29	75.6	15	70.6	72.1	193,182	273,687	439,171	155,105
Aug.			1	70.8	31	43.1	59.8	160,168	270,308	420,673	160,168
Sept.			7	46.1	29	36.0	37.6	97,502	161,534	336,960	66,156
Oct.			29	31.2	! 9	26.5	28.1	75,185	87,848	280,817	12,894
Nov.			30	37.0	3	27.2	31.6	81,942	75,348	258,388	9,271
Dec.			12	61.4	1	33.7	40.4	108,130	111,808	247,899	10,886
Yearly				89.5		26.5	53.8	1,696,766	2,029,884	3,451,533	1,569,404

ϕ Mean daily ! And other days

09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE – STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.07	31.22	31.30	31.66	31.65	31.09	31.51	31.45	31.10	30.99	30.77	30.92
2	31.08	31.26	31.37	31.63	31.59	31.16	31.48	31.41	31.06	30.99	30.83	30.88
3	31.10	31.17	31.30	31.61	31.55	31.21	31.48	31.35	31.08	31.01	30.79	30.83
4	31.05	31.18	31.35	31.61	31.56	31.23	31.47	31.34	31.12	30.96	30.81	30.80
5	31.15	31.17	31.35	31.60	31.54	31.24	31.47	31.41	31.01	30.96	30.87	30.78
6	31.20	31.21	31.48	31.60	31.50	31.23	31.47	31.45	31.06	30.98	30.93	30.81
7	31.18	31.19	31.43	31.61	31.43	31.30	31.47	31.44	31.12	30.96	30.99	30.81
8	31.21	31.16	31.37	31.67	31.40	31.30	31.49	31.41	31.19	30.97	30.98	30.79
9	31.14	31.17	31.37	31.67	31.38	31.24	31.49	31.41	31.07	30.92	30.98	30.82
10	30.97	31.20	31.41	31.65	31.37	31.25	31.49	31.38	31.02	30.91	30.97	30.83
11	31.03	31.20	31.50	31.64	31.35	31.28	31.48	31.41	30.99	30.89	30.95	30.98
12	31.08	31.16	31.51	31.66	31.37	31.30	31.50	31.43	30.97	30.90	30.96	31.16
13	31.03	31.16	31.49	31.67	31.29	31.30	31.52	31.41	31.04	30.87	30.92	30.98
14	31.09	31.13	31.47	31.67	31.20	31.32	31.55	31.40	31.05	30.85	30.90	30.93
15	30.97	31.13	31.51	31.68	31.09	31.33	31.51	31.38	31.07	30.84	30.90	30.93
16	31.00	31.13	31.50	31.68	31.04	31.32	31.54	31.38	31.09	30.82	30.89	30.91
17	31.03	31.15	31.50	31.69	31.01	31.37	31.53	31.38	31.08	30.83	30.90	30.93
18	31.07	31.13	31.55	31.69	31.04	31.43	31.53	31.49	31.10	30.83	30.91	30.91
19	31.10	31.14	31.56	31.69	31.04	31.47	31.53	31.36	31.07	30.81	30.93	30.88
20	31.10	31.19	31.58	31.69	31.06	31.48	31.51	31.36	31.07	30.83	30.87	30.87
21	31.08	31.20	31.59	31.70	31.07	31.49	31.50	31.35	31.10	30.86	30.83	30.87
22	31.07	31.19	31.59	31.65	31.10	31.53	31.51	31.34	31.06	30.95	30.75	30.85
23	31.07	31.20	31.60	31.66	31.10	31.50	31.51	31.33	31.08	30.88	30.73	30.83
24	31.05	31.19	31.60	31.64	31.08	31.55	31.49	31.32	31.10	30.84	30.76	30.81
25	31.03	31.19	31.59	31.64	31.06	31.56	31.49	31.32	31.12	30.82	30.78	30.89
26	31.04	31.20	31.60	31.64	30.99	31.57	31.49	31.33	31.11	30.79	30.78	30.80
27	31.04	31.23	31.62	31.63	30.94	31.60	31.48	31.31	31.07	30.79	30.78	30.91
28	31.15	31.23	31.63	31.64	30.98	31.59	31.48	31.31	31.01	30.77	30.90	30.96
29	31.19		31.62	31.65	30.99	31.59	31.53	31.32	31.00	30.78	30.91	30.97
30	31.19		31.60	31.68	31.00	31.58	31.52	31.27	31.03	30.75	30.95	31.02
31	31.20		31.61		31.02		31.50	31.18		30.75		31.06
Avg.	31.09	31.18	31.50	31.65	31.22	31.38	31.50	31.37	31.07	30.87	30.87	30.89

09-5220.41 COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.8 kilometres downstream from the northerly international boundary, and about 12.1 kilometres downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 metre below mean sea level.
RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1991.
REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date, mean daily gage heights were determined from hourly readings of staff gage.
EXTREMES: Maximum mean daily gage height, 34.74 metres on August 18, 1983; minimum mean gage height, 29.55 metres on several days during January 1988.

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.55	29.61	29.59	29.58	29.60	29.62	29.66	29.70	29.76	29.65	29.64	29.66
2	29.55	29.80	30.07	29.58	29.61	29.62	29.66	29.70	29.75	29.65	29.64	29.66
3	29.55	29.70	29.67	29.58	29.61	29.62	29.66	29.69	29.75	29.65	29.64	29.66
4	29.55	29.60	29.56	29.58	29.61	29.61	29.66	29.69	29.76	29.66	29.64	29.66
5	30.00	29.59	29.56	29.58	29.60	29.62	29.67	29.70	29.75	29.66	29.64	29.66
6	31.11	29.59	29.78	29.58	29.62	29.67	29.66	29.72	29.76	29.65	29.65	29.66
7	30.72	29.59	29.64	29.58	29.62	29.64	29.66	29.72	29.86	29.67	29.65	29.67
8	30.91	29.58	29.56	29.58	29.62	29.63	29.65	29.72	31.38	29.68	29.65	29.66
9	31.04	29.59	29.56	29.58	29.62	29.62	29.66	29.72	30.44	29.67	29.65	29.67
10	29.78	29.59	29.56	29.58	29.63	29.62	29.66	29.72	29.80	29.67	29.65	29.67
11	29.59	29.59	29.56	29.58	29.62	29.63	29.66	29.72	29.71	29.67	29.65	29.67
12	29.57	29.59	29.56	29.58	29.62	29.64	29.67	29.72	29.69	29.67	29.64	30.25
13	29.56	29.59	29.61	29.58	29.62	29.64	29.67	29.72	29.69	29.67	29.65	29.69
14	30.67	29.59	29.57	29.58	29.61	29.64	29.67	29.69	29.69	29.66	29.65	29.63
15	31.12	29.59	29.57	29.58	29.61	29.63	29.67	29.69	29.69	29.66	29.65	29.61
16	30.51	29.59	29.57	29.58	29.60	29.63	29.67	29.73	29.68	29.66	29.66	29.60
17	30.13	29.59	29.57	29.58	29.61	29.64	29.67	29.75	29.68	29.65	29.66	29.59
18	29.77	29.59	29.57	29.58	29.60	29.66	29.67	29.76	29.68	29.66	29.66	29.59
19	29.65	29.59	29.57	29.58	29.59	29.67	29.67	29.76	29.67	29.65	29.66	29.59
20	29.64	29.58	29.57	29.58	29.60	29.70	29.67	29.76	29.67	29.65	29.65	29.59
21	29.62	29.59	29.57	29.58	29.61	29.70	29.67	29.77	29.68	29.66	29.66	29.59
22	29.61	29.59	29.57	29.58	29.61	29.67	29.67	29.77	29.68	29.65	29.65	29.59
23	29.61	29.59	29.57	29.58	29.62	29.65	29.67	29.77	29.67	29.65	29.64	29.59
24	29.61	29.59	29.57	29.59	29.62	29.65	29.68	29.77	29.67	29.65	29.65	29.59
25	29.61	29.59	29.57	29.58	29.61	29.65	29.69	29.77	29.67	29.65	29.65	29.59
26	29.61	29.59	29.57	29.59	29.61	29.66	29.68	29.77	29.67	29.65	29.65	29.59
27	29.61	29.59	29.57	29.60	29.62	29.66	29.68	29.77	29.67	29.65	29.66	29.59
28	29.61	29.59	29.58	29.59	29.63	29.66	29.68	29.77	29.67	29.65	29.66	29.59
29	29.60		29.58	29.60	29.63	29.66	29.69	29.78	29.67	29.65	29.66	29.59
30	29.60		29.58	29.60	29.63	29.66	29.70	29.78	29.66	29.64	29.66	29.59
31	29.60		29.58		29.62		29.70	29.78		29.64		29.59
Avg.	29.92	29.60	29.60	29.58	29.61	29.65	29.67	29.74	29.79	29.66	29.65	29.64

09-5319.00 WELLTON-MOHAWK DRAINAGE WATER DISCHARGED TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.8 kilometre downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.
RECORDS: Based on discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1991.
REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 19.3 kilometres, and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 3.1 kilometres upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	.16	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	.31	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	.02	0	0	0	0	0	0
19	0	0	0	0	0	.01	0	0	0	0	0	0
20	0	0	0	0	0	.04	0	0	0	0	0	0
21	0	0	0	0	0	.06	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0		0	0	0	0	0	0	0	0	0	0
30	0		0	0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	0	0	0	0	0	0.29	0	0	0.31	0	0	0

Current Year 1991 | Period 1966–1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme–Cubic Metres per Second Day	Extreme–Cubic Metres per Second High	Extreme–Cubic Metres per Second Day	Extreme–Cubic Metres per Second Low	Average	Volume–Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	0	0	! 1	0	! 1	0	0	0	9,209	23,088	0
Feb.	0	0	! 1	0	! 1	0	0	0	7,168	20,959	0
Mar.	0	0	! 1	0	! 1	0	0	0	5,058	22,827	0
April	0	0	! 1	0	! 1	0	0	0	4,529	22,944	0
May	0	0	! 1	0	! 1	0	0	0	6,826	23,548	0
June	.54	0	6	3.48	! 1	0	.01	25.1	5,373	23,135	0
July	0	0	! 1	0	! 1	0	0	0	4,935	23,370	0
Aug.	0	0	! 1	0	! 1	0	0	0	5,018	23,668	0
Sept.	.53	0	9	3.34	! 1	0	.01	26.8	7,052	22,787	0
Oct.	0	0	! 1	0	! 1	0	0	0	9,925	23,683	0
Nov.	0	0	! 1	0	! 1	0	0	0	9,408	22,792	0
Dec.	0	0	! 1	0	! 1	0	0	0	8,545	23,585	0
Yearly	0.54	0		3.48		0	0	51.9	83,046	264,928	0

! And other days

09-5325.00 ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona, 6.9 kilometres downstream from the northerly international boundary and 5.1 kilometres downstream from Morelos Diversion Dam. It is the largest of three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. Since June 1986, zero of the gage is 34.05 metres above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1991, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 12,014,000 m3 in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 22.7 m3/sec on December 3, 1961, at a maximum gage height of 35.84 metres; minimum instantaneous discharge, zero during parts of most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.07	0	0.41	0.19	0	0.07	0	0.02	0.07	0	0.01	1.01
2	.03	0	.07	.05	.01	.01	0	0	.07	.04	.08	.89
3	.04	0	.56	.01	.01	.02	0	0	.07	0	1.12	.09
4	.06	0	.98	0	0	.01	0	0	.05	.01	.16	.02
5	.05	0	.16	0	.41	.01	0	.01	.05	0	.09	.03
6	.02	.02	.09	0	.30	0	0	.01	.07	.02	.05	.16
7	0	.05	.01	0	.09	0	0	0	0	.05	0	.03
8	0	.09	0	0	.09	0	.02	.01	.01	0	0	.07
9	0	0	0	0	0	0	0	0	.07	.06	.08	.05
10	0	.01	.03	.01	0	.02	0	0	.01	.01	.03	.10
11	0	.03	.01	.01	0	.01	.01	0	0	.04	.12	0
12	0	0	0	.01	0	.01	0	0	0	0	0	0
13	0	.05	0	.02	.02	.01	.01	0	0	.02	.02	0
14	0	.38	0	0	.03	.01	0	0	0	0	.10	.03
15	0	.03	0	0	0	.01	0	.01	0	.02	0	0
16	0	.01	.04	0	0	.01	0	0	0	0	0	0
17	.03	0	0	0	0	.01	.02	.05	0	0	.02	.07
18	.04	0	0	.01	.02	0	.01	0	.02	0	0	.17
19	0	.06	0	0	.02	0	.01	0	.06	0	.01	.18
20	.04	.05	0	0	.01	0	.01	0	.01	.01	0	.08
21	.01	.21	0	.02	.01	0	.03	.06	.01	0	.01	0
22	0	.05	0	.02	0	.04	.19	0	.02	0	.04	.03
23	0	0	0	.02	.01	.01	0	0	.02	0	0	0
24	0	.05	0	.02	.01	0	0	.04	.05	0	0	.01
25	.01	.07	.14	.01	0	0	0	0	.11	0	0	0
26	0	0	.03	.01	0	0	0	0	0	0	.05	0
27	.90	.02	.01	.01	0	0	.10	.01	.04	0	.01	0
28	.49	.01	.04	0	0	.01	2.36	.03	0	.01	.02	.02
29	.10		.10	0	0	0	.84	.01	0	.05	.09	.09
30	.07		0	0	.03	0	.27	.14	0	0	.05	.06
31	0		.24		.05		.22	.06		.04		.25
Sum	1.96	1.19	2.92	0.42	1.12	0.27	4.10	0.46	0.81	0.38	2.16	3.44

Current Year 1991 | Period 1935–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
			High		Low			Total	Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	0.96	0	27	5.24	! 1	0	0.06	169	2,936	11,804	0
Feb.	.30	0	14	1.57	! 1	0	.04	103	2,404	10,398	17.9
Mar.	.82	0	3	4.05	! 2	0	.09	252	2,263	7,685	72.9
April	.28	0	1	1.06	! 1	0	.01	36.3	2,089	7,771	0
May	.72	0	5	3.31	! 1	0	.04	96.8	2,465	11,496	10.2
June	.14	0	! 1	.29	! 3	0	.01	23.3	2,340	9,177	13.0
July	.91	0	28	4.76	! 1	0	.13	354	2,367	10,263	11.2
Aug.	.21	0	1	.63	! 1	0	.01	39.7	2,043	12,014	39.7
Sept.	.12	0	27	.24	! 1	0	.03	70.0	1,476	7,574	7.4
Oct.	.12	0	29	.22	! 1	0	.01	32.8	2,013	7,006	14.7
Nov.	.68	0	3	3.03	! 1	0	.07	187	2,454	10,139	23.2
Dec.	1.05	0	1	6.00	! 1	0	.11	297	3,207	11,632	76.4
Yearly	1.05	0		6.00		0	0.05	1,661	28,057	102,255	1,163

! And other days

09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE – STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 6.9 kilometres downstream from northerly international boundary, 5.1 kilometres downstream from Morelos Dam, about 15 metres downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 17.7 kilometres downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 399 metres downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.12 metre lower than the old gage.
RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1991; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.
REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.
EXTREMES: Since November 1947, maximum mean daily gage height, 33.15 metres on June 28, 1983; minimum mean daily gage height, 28.65 metres on September 13, 1988 and other days since that time.

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	28.90	28.93	28.99	29.04	29.01	29.05	29.10	29.07	29.06	29.12	29.14	29.17
2	28.91	28.93	29.07	29.00	29.01	29.04	29.10	29.07	29.06	29.12	29.14	29.09
3	28.90	29.13	29.26	28.99	29.02	29.04	29.09	29.06	29.04	29.12	29.14	28.86
4	28.91	28.98	29.13	28.98	29.02	29.05	29.09	29.06	29.05	29.12	29.25	28.83
5	28.93	28.95	29.04	28.98	29.04	29.04	29.09	29.05	29.04	29.12	29.21	28.81
6	29.71	28.93	29.02	28.98	29.11	29.04	29.09	29.04	29.03	29.13	29.17	28.84
7	29.76	28.92	29.16	28.99	29.05	29.06	29.10	29.04	29.01	29.14	29.16	28.82
8	29.57	28.93	29.00	28.99	29.04	29.05	29.11	29.04	29.60	29.14	29.15	28.82
9	29.87	28.91	28.96	28.99	29.03	29.05	29.11	29.03	29.79	29.14	29.17	28.83
10	29.33	28.91	28.97	28.99	29.03	29.05	29.12	29.03	29.33	29.14	29.17	29.04
11	29.05	28.92	28.97	28.99	29.03	29.05	29.12	29.03	29.20	29.13	29.18	29.13
12	28.99	28.91	28.96	28.98	29.04	29.05	29.13	29.03	29.15	29.14	29.16	29.30
13	28.97	28.92	28.97	29.00	29.04	29.05	29.13	29.03	29.14	29.14	29.15	29.31
14	29.29	28.97	28.99	28.99	29.06	29.05	29.14	29.03	29.13	29.14	29.17	29.19
15	29.96	28.93	28.96	28.99	29.05	29.05	29.14	29.04	29.12	29.15	29.15	29.15
16	29.47	28.92	28.96	28.99	29.05	29.05	29.14	29.02	29.12	29.15	29.15	29.14
17	29.35	28.92	28.96	28.97	29.06	29.05	29.15	29.03	29.11	29.14	29.15	29.14
18	29.13	28.92	28.95	28.97	29.07	29.05	29.15	29.05	29.11	29.14	29.15	29.15
19	29.01	28.93	28.97	28.97	29.07	29.06	29.14	29.04	29.11	29.14	29.15	29.17
20	28.97	28.93	28.96	28.97	29.07	29.07	29.15	29.04	29.11	29.14	29.14	29.15
21	28.96	28.96	28.96	28.97	29.05	29.08	29.16	29.06	29.11	29.14	29.14	29.13
22	28.93	28.94	28.95	28.96	29.04	29.09	29.19	29.05	29.11	29.14	29.14	29.13
23	28.92	28.93	28.96	28.96	29.05	29.09	29.19	29.04	29.14	29.14	29.13	29.12
24	28.93	28.93	28.97	28.97	29.05	29.08	29.19	29.04	29.13	29.14	29.12	29.12
25	28.93	28.94	28.99	28.98	29.05	29.08	29.21	29.04	29.14	29.14	29.12	29.12
26	28.93	28.93	28.99	28.98	29.05	29.08	29.20	29.04	29.13	29.14	29.13	29.12
27	29.00	28.93	28.97	28.99	29.05	29.08	29.20	29.04	29.13	29.15	29.12	29.12
28	29.05	28.94	28.97	28.99	29.05	29.08	29.29	29.04	29.12	29.15	29.12	29.12
29	28.96		28.99	28.99	29.06	29.09	29.26	29.04	29.11	29.15	29.13	29.14
30	28.94		28.97	29.00	29.05	29.09	29.17	29.07	29.11	29.14	29.14	29.13
31	28.93		28.99		29.05		29.08	29.06		29.14		29.16
Avg.	29.14	28.94	29.00	28.98	29.05	29.06	29.15	29.04	29.15	29.14	29.15	29.08

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 61 metres downstream from present site on west side of levee. This wasteway is located in Arizona, 29.8 kilometres downstream from the northerly international boundary, 28.0 kilometres downstream from Morelos Diversion Dam, and 3.5 kilometres upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1991, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 3,528,000 m3 in January 1946; minimum monthly discharge, 150,000 m3 in September 1950. Since January 1, 1951, maximum instantaneous discharge, 2.89 m3/sec on January 24, 1954, at a maximum gage height of 29.10 metres (old datum); minimum instantaneous discharge, zero during a part of most months.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	.05	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0		0	0	0	0	0	0	0	0	0	0
30	0		0	0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	0	0	0	0	0	0	0	0	0.05	0	0	0

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
			High		Low			Total	Average	Maximum	Minimum
	High	Low	Day	High	Day	Low					
	Current Year 1991								Period 1939-1991		
Jan.	0	0	! 1	0	! 1	0	0	0	725	3,528	0
Feb.	0	0	! 1	0	! 1	0	0	0	622	3,096	0
Mar.	.18	0	! 1	.20	! 1	0	0	0	566	2,048	0
April	0	0	! 1	0	! 1	0	0	0	606	2,393	0
May	0	0	! 1	0	! 1	0	0	0	733	3,047	0
June	0	0	! 1	0	! 1	0	0	0	646	2,899	0
July	0	0	! 1	0	! 1	0	0	0	560	2,405	0
Aug.	0	0	! 1	0	! 1	0	0	0	585	3,121	0
Sept.	.27	0	20	.36	! 1	0	0	4.3	520	2,689	0
Oct.	0	0	! 1	0	! 1	0	0	0	648	2,590	0
Nov.	0	0	! 1	0	! 1	0	0	0	775	2,936	0
Dec.	0	0	! 1	0	! 1	0	0	0	824	3,306	0
Yearly	0.27	0		0.36		0	0	4.3	7,810	30,060	0

! And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 91 metres north of the international boundary near San Luis, Arizona and 2.4 kilometres east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder was moved west 31 metres to a temporary bypass channel. On April 7, 1978 recorder was moved back to original site.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1991. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.

REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the limitrophe section of the Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.27	0.18	0.22	0.14	0.08	0.40	0.18	0.42	0.03	0.52	0.04	0.59
2	.45	.02	.24	.33	.05	.48	.22	.35	.12	.52	.10	.53
3	.20	.22	.08	.03	.28	.28	.18	.24	.35	.57	.12	.34
4	.39	.36	.04	.05	.42	.31	.08	.26	.13	.10	.02	.25
5	.47	.37	.25	.08	.23	.29	.39	.29	.29	.62	.06	.32
6	.76	.20	.52	.11	.12	.02	.20	.20	.37	.44	.12	.54
7	.46	.10	.40	.21	0	.21	.56	.29	.40	.27	.17	.37
8	.57	.04	.32	.27	.02	.29	.20	.17	.21	.14	.19	.08
9	.60	.18	.39	.46	.09	.19	.17	.02	.19	.35	.33	.36
10	.66	.02	.70	.33	.01	.07	.05	.01	.18	.26	.56	.39
11	.44	.05	.16	.03	.10	.01	.06	.17	.22	.68	.39	.35
12	.67	.48	.13	.20	.12	.13	.10	.12	.03	.23	.34	.19
13	.63	.24	.22	.19	.12	.22	.28	.38	.11	.48	.20	.49
14	.63	.41	.14	.04	.25	.22	.71	.23	.01	.17	.20	.18
15	.48	.10	.07	.19	.29	.13	.53	.32	0	.42	.22	.16
16	.13	.33	.05	.42	.55	.13	.23	.15	0	.35	.21	.20
17	.32	.12	.01	.49	.19	.07	.16	.19	.02	.29	.05	.18
18	.63	.18	.10	.19	.03	.23	.13	.25	0	.40	.53	.18
19	.39	.13	.59	.40	.52	.30	.41	.35	.15	.35	.56	.29
20	.31	.01	.35	.37	.70	.22	.14	.14	.11	.16	.32	.61
21	.15	.01	.69	.07	.61	.01	.10	.03	.20	.08	.29	.29
22	.12	.10	.10	.14	.42	.02	.77	.31	.22	.35	.29	.33
23	.39	.05	.52	.03	.52	.12	.20	.46	.08	.48	.29	.52
24	.03	.32	.59	.01	.33	.29	.34	.26	.20	.36	.29	.36
25	.04	.29	.86	0	.62	.04	.02	.39	.41	.09	.29	.33
26	.48	.02	1.00	.09	.47	.22	0	.51	.20	.05	.17	.47
27	.42	.04	.33	.17	.58	.04	.07	.40	.17	.08	.42	.36
28	.36	.10	.61	.15	.71	.33	.06	.16	.32	0	.68	.18
29	.22		.39	.25	.69	.41	.40	.27	.16	.02	.49	.37
30	.02		.42	.40	.41	.72	.12	.40	.50	.05	.25	.18
31	0		.29		.69		.01	.48		.05		.02
Sum	11.69	4.67	10.78	5.84	10.22	6.40	7.07	8.22	5.38	8.93	8.19	10.01

Current Year 1991 | Period 1935–1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme-Cubic Metres per Second High Day	High	Low Day	Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	0.27	0	4	0.81	! 8	0	0.38	1,010	1,162	4,144	111
Feb.	.32	0	11	1.10	!14	0	.17	403	966	3,910	164
Mar.	.34	0	15	1.18	! 1	0	.35	931	1,113	3,602	175
April	.24	.01	15	.64	! 1	0	.19	505	1,082	3,910	165
May	.30	0	7	1.00	! 7	0	.33	883	1,216	3,750	281
June	.33	0	27	1.12	! 6	0	.21	553	1,022	4,515	157
July	.30	0	15	1.00	!10	0	.23	611	1,097	4,428	210
Aug.	.31	.01	20	1.05	!22	0	.27	710	1,131	4,885	196
Sept.	.28	0	5	.84	!19	0	.18	465	1,077	3,910	196
Oct.	.31	0	18	1.05	! 4	0	.29	772	1,130	4,046	379
Nov.	.29	0	18	.91	! 3	0	.27	708	1,226	4,404	297
Dec.	.33	0	22	1.14	! 4	0	.32	865	1,188	3,799	305
Yearly	0.34	0		1.18		0	0.27	8,416	13,410	47,255	3,733

! And other days

09-5340.00 YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 61 metres north of the international boundary near San Luis, Arizona, 2.1 kilometres east of the Colorado River.

RECORDS: Main Drain discharges are lifted 3.05 to 3.66 metres at the pumping plant. Prior to April 1, 1969, discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. Records obtained and computed by the United States Section of the Commission. Records available: Monthly discharges, June 1919 through 1951; daily discharges January 1952 through 1991.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the limitrophe section of the river.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.60	3.26	3.20	2.97	3.29	3.57	3.17	2.53	3.12	3.74	4.73	4.16
2	3.62	3.23	3.17	2.79	3.12	3.43	2.97	2.61	2.97	3.88	5.15	4.19
3	3.82	3.03	3.00	2.70	3.51	3.40	3.12	2.92	2.55	4.05	5.01	3.94
4	3.88	3.12	3.12	2.97	3.60	3.26	3.12	2.97	2.92	3.74	4.76	3.96
5	3.71	3.17	2.86	3.14	3.46	3.40	2.83	2.89	3.03	4.33	4.47	3.99
6	3.37	3.26	3.00	3.31	3.46	3.20	2.61	3.00	3.40	4.30	4.50	4.30
7	3.65	3.60	2.92	3.54	3.26	3.37	2.59	3.12	3.34	4.47	4.42	4.28
8	3.34	2.92	2.97	3.29	3.12	3.20	2.53	2.97	3.40	3.88	4.62	4.08
9	3.37	2.89	2.97	3.29	3.20	3.26	2.76	2.64	3.37	4.59	5.04	4.19
10	3.23	2.40	3.00	3.34	3.34	3.14	2.37	2.76	3.37	4.64	4.79	4.81
11	3.14	2.36	3.00	3.14	3.37	2.95	2.86	3.31	3.31	4.56	4.84	4.05
12	3.12	3.14	2.82	3.34	3.34	2.92	2.86	2.92	3.20	4.73	4.67	3.96
13	3.17	3.20	2.97	3.26	3.14	2.95	3.34	3.03	3.29	4.90	4.50	4.02
14	3.20	3.23	2.83	3.26	3.40	3.17	3.34	2.80	3.54	4.62	4.56	4.08
15	3.17	3.17	3.09	3.06	3.34	3.26	3.03	2.72	3.46	4.76	4.64	3.54
16	2.92	3.14	3.40	3.31	3.68	3.03	3.20	3.03	3.29	4.79	4.47	3.77
17	2.86	3.37	3.40	3.14	3.71	2.95	3.12	3.17	3.29	4.62	4.93	3.62
18	3.03	3.12	2.95	3.12	3.71	3.12	3.00	3.06	3.23	4.47	4.79	3.68
19	2.95	2.86	3.23	3.23	3.88	3.00	3.14	2.89	3.46	4.76	4.30	3.46
20	3.06	3.17	3.17	3.46	3.88	3.00	3.09	3.20	3.23	4.76	4.28	3.40
21	3.23	3.09	3.06	3.12	3.62	3.14	2.97	2.89	3.23	4.87	4.30	3.46
22	3.23	3.06	3.17	3.06	3.54	3.12	2.95	2.73	3.23	4.62	4.30	3.40
23	3.23	3.57	3.00	3.34	3.26	3.03	2.82	3.00	3.37	4.90	4.33	3.54
24	3.17	3.23	2.86	3.12	3.40	2.95	3.17	3.23	3.40	4.81	4.22	3.40
25	3.06	3.14	3.06	3.26	3.29	2.82	3.00	3.06	3.62	5.13	4.36	3.79
26	3.57	3.03	3.31	3.26	3.34	2.89	2.92	3.06	3.43	5.07	4.02	3.57
27	3.29	3.12	3.48	3.29	3.17	2.86	2.92	3.00	3.46	4.79	4.39	3.37
28	3.03	3.14	3.26	3.23	3.48	3.09	2.92	2.92	3.68	4.73	4.36	3.46
29	3.17		3.48	3.43	3.46	3.40	2.86	3.23	3.62	4.79	4.30	3.46
30	3.09		3.17	3.51	3.46	3.09	2.78	3.03	3.62	4.79	4.28	3.31
31	3.23		3.26		3.54		2.76	3.20		4.79		3.65
Sum	101.51	87.02	96.18	96.28	106.37	93.97	91.12	91.89	99.43	141.88	136.33	117.89

Current Year 1991 | Period 1935-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			4	3.88	17	2.86	3.27	8,770	9,373	13,819	2,146
Feb.			7	3.60	11	2.36	3.11	7,519	9,103	14,787	2,023
Mar.			!27	3.48	12	2.82	3.10	8,310	10,442	15,332	2,393
April			7	3.54	3	2.70	3.21	8,319	10,306	14,666	2,368
May			!19	3.88	! 2	3.12	3.43	9,190	10,540	16,208	2,405
June			1	3.57	25	2.82	3.13	8,119	9,770	14,851	2,825
July			!13	3.34	10	2.37	2.94	7,873	9,711	14,715	3,121
Aug.			11	3.31	2	2.61	2.96	7,939	9,696	14,752	3,158
Sept.			28	3.68	3	2.55	3.31	8,591	9,731	14,269	2,812
Oct.			25	5.13	! 1	3.74	4.58	12,258	11,052	15,277	3,626
Nov.			2	5.15	26	4.02	4.54	11,779	10,533	14,814	3,454
Dec.			10	4.81	30	3.31	3.80	10,186	10,007	14,160	3,022
Yearly				5.15		2.36	3.45	108,853	120,264	171,922	33,353

ϕ Mean daily ! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.5 kilometre upstream from outlet to Yuma Main Drain, which is 53 metres upstream from East Main Canal Wasteway outlet and 0.6 kilometre west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 46 metres upstream from outlet to Yuma Main Drain.
RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 1991.
REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.79	0.28	0.09	0.97	0.26	0.23	0.36	0.08	0.31	0.40	0.67	0.28
2	.46	.36	.17	.45	.27	.19	.19	.37	.32	.36	.37	.60
3	.24	.11	.52	.14	.26	.09	.11	.14	.36	.09	.07	.07
4	.50	.15	.54	.09	.30	.21	.08	.04	.37	.21	.25	.01
5	.77	.16	.09	.06	.28	.25	.09	.23	.18	.21	.10	.19
6	1.09	.28	.02	.19	.39	.23	.21	.25	.14	.29	.03	.44
7	.91	.47	.01	.01	.07	.37	.34	.15	.12	.25	.13	.25
8	.73	.53	.01	.14	.02	.35	.45	.05	.24	.33	.54	.51
9	.63	.41	.06	.06	.06	.12	.25	.42	.28	.13	.31	.20
10	.63	.28	.14	.11	.15	.07	.27	.59	.02	.41	.30	.29
11	.61	.33	.38	.27	.15	.10	.42	.78	.05	.46	.49	.34
12	.59	.37	.20	.24	.33	.03	.46	.65	.08	.31	.24	.12
13	.50	.20	.46	.37	.35	.15	.44	.59	.05	.37	.17	.09
14	.21	.29	.24	.25	.18	.22	.48	.39	.25	.42	.27	.39
15	0	.30	.14	.16	.25	.10	.34	.10	.15	.34	.16	.67
16	.08	.21	.36	.31	.49	.03	.40	.16	.17	.09	.30	.27
17	.25	.29	.48	.25	.22	.03	.33	.56	.02	.30	.25	.26
18	.85	.23	.26	.21	.27	.03	.42	.41	.25	.44	.14	.37
19	.72	.33	.13	.33	.08	.23	.19	.42	.45	.55	.30	.52
20	.54	.32	.20	.20	.11	.37	.23	.31	.23	.27	.20	.25
21	.36	.19	.10	.67	.22	.30	.20	.14	.33	.09	.33	.49
22	.34	.12	.09	.60	.17	.23	.21	.21	.01	.09	.31	.53
23	.52	0	.53	.49	.34	.18	.13	.32	.55	.22	.14	.31
24	.48	.15	.34	.36	.30	.17	.15	.51	.44	.34	.08	.14
25	.54	.32	.36	.66	.33	.17	.35	.15	.71	.27	.19	.40
26	.37	.22	.48	.55	.34	.18	.46	.16	.52	.08	.34	.34
27	.86	.16	.66	.37	.31	.22	.48	.35	.08	.11	.08	.24
28	.97	.18	.47	.06	.19	.10	.46	.47	.06	.13	.28	.14
29	.34		.20	.07	.29	.24	.29	.41	.30	.25	.24	.03
30	.01		.16	.19	.17	.24	.03	.33	.22	.22	.17	.07
31	.04		.48		.20		.01	0		.11		.02
Sum	15.93	7.24	8.37	8.83	7.35	5.43	8.83	9.74	7.26	8.14	7.45	8.83

Current Year 1991 | Period 1971–1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.65	0.01	27	1.24	!14	0	0.51	1,376	512	1,376	48.7
Feb.	.58	0	7	.84	! 4	0	.26	626	523	840	196
Mar.	.65	.01	27	1.00	! 9	0	.27	723	559	1,158	250
April	.74	0	1	1.23	! 4	0	.29	763	453	819	202
May	.58	.01	1	.84	17	0	.24	635	411	654	183
June	.50	.01	5	.76	!18	0	.18	469	389	699	55.8
July	.56	.01	26	1.01	! 4	0	.28	763	398	763	77.3
Aug.	.68	.01	12	1.30	8	0	.31	842	454	950	121
Sept.	.60	0	19	.88	11	0	.24	627	482	947	234
Oct.	.58	.01	6	.85	5	0	.26	703	460	898	164
Nov.	.65	.01	8	1.01	!24	0	.25	644	444	845	32.3
Dec.	.67	.01	1	1.06	!15	0	.28	763	525	1,204	43.5
Yearly	0.74	0		1.30		0	0.28	8,934	5,610	8,934	3,179

! And other days

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 3.7-metre Parshall flume located 31 metres upstream from confluence of East Main Canal Wasteway, 34 metres north of the southerly land boundary, and 2.3 kilometres east of the Colorado River.
RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 1991.
REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.44	1.41	0.64	1.01	0	1.62	2.23	1.95	1.97	0.66	0.80	0.80
2	1.42	1.40	0	0	0	1.61	2.21	1.96	1.99	.28	.80	.42
3	1.46	1.41	0	1.00	.91	1.59	2.21	1.97	1.97	1.03	.80	.61
4	.67	1.40	0	1.84	1.61	1.57	2.21	1.96	1.97	1.53	.80	.62
5	.01	1.40	0	1.84	1.60	1.57	2.21	1.97	1.26	1.76	.80	.71
6	0	1.41	0	1.83	1.59	1.57	2.21	1.97	0	1.74	.80	.68
7	0	1.40	0	1.81	1.60	1.56	2.19	1.97	0	1.53	.80	.62
8	.78	1.41	.71	1.80	1.59	1.56	2.19	1.97	0	1.17	.79	.62
9	.59	1.39	1.40	1.80	.77	1.57	2.20	1.97	0	1.18	.80	.62
10	.01	1.39	1.40	1.80	.92	1.56	2.21	1.97	0	.89	.80	.30
11	0	1.39	1.39	1.80	1.59	1.57	2.21	1.97	.69	.80	.80	0
12	0	1.40	.72	1.80	1.59	1.57	2.21	.99	1.34	.80	.82	0
13	0	1.41	0	1.80	1.59	1.57	2.21	.08	1.34	.81	.83	0
14	0	1.41	0	1.80	1.61	1.59	2.21	1.28	1.34	.80	.83	0
15	0	1.42	0	1.79	1.63	1.59	2.21	1.97	1.34	.81	.83	0
16	0	1.42	0	1.81	1.63	1.59	2.21	1.97	1.35	.82	.83	0
17	.86	1.43	0	1.83	1.62	1.57	2.21	1.99	1.37	.82	.83	0
18	.68	1.46	0	1.82	1.62	1.57	2.21	1.99	1.38	.82	.83	0
19	0	1.47	0	1.82	1.61	1.58	2.21	1.98	1.16	.80	.83	0
20	0	1.49	0	1.82	1.62	1.58	2.21	1.99	1.58	.80	.83	.43
21	0	1.50	0	1.80	1.61	1.57	2.21	2.01	1.59	.80	.82	.78
22	0	1.51	0	1.28	1.60	1.57	2.21	2.01	1.59	.80	.82	.78
23	.83	1.52	0	0	1.59	1.59	2.21	2.00	1.59	.80	.82	.78
24	1.45	1.52	0	0	1.58	1.58	2.20	1.99	1.66	.80	.81	.78
25	1.46	1.50	.59	0	1.58	1.57	2.20	1.98	1.77	.81	.80	.78
26	1.45	1.52	2.22	0	1.57	1.58	2.19	1.98	1.76	.81	.80	1.00
27	1.43	1.52	2.22	0	1.56	1.94	2.18	1.97	1.76	.80	.80	1.17
28	1.43	1.48	2.21	0	1.61	2.16	2.14	1.98	1.75	.80	.80	1.17
29	1.42		2.21	0	1.62	2.16	2.16	1.97	1.75	.80	.80	1.17
30	1.41		2.21	0	1.61	2.16	2.08	1.99	1.74	.80	.80	1.17
31	1.41		2.23		1.61		1.97	1.98		.80		1.17
Sum	20.21	40.39	20.15	35.90	44.24	49.44	67.92	57.73	39.01	28.67	24.32	17.18

Current Year 1991 | Period 1970-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second					Volume-Thousands of Cubic Metres			
			High		Low		Average	Total	Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	0.33	0	18	1.50	! 6	0	0.65	1,746	890	3,406	0
Feb.	.33	.31	!27	1.54	! 1	1.39	1.44	3,490	1,223	3,677	0
Mar.	.43	0	26	2.31	! 2	0	.65	1,741	1,152	4,717	0
April	.42	0	1	2.24	! 2	0	1.20	3,102	1,251	5,154	0
May	.35	0	!17	1.70	! 1	0	1.43	3,822	1,628	4,269	13.9
June	.41	.33	!27	2.16	! 7	1.54	1.65	4,272	1,568	4,272	26.4
July	.41	.37	! 1	2.24	31	1.93	2.19	5,868	1,670	5,868	20.1
Aug.	.40	0	23	2.09	13	0	1.86	4,988	1,423	4,988	0
Sept.	.40	0	4	2.09	! 6	0	1.30	3,370	1,237	3,370	0
Oct.	.36	0	! 1	1.76	! 1	0	.92	2,477	1,012	3,344	0
Nov.	.22	.21	!12	.83	! 8	.78	.81	2,101	489	2,101	0
Dec.	.28	0	26	1.17	!10	0	.55	1,484	964	3,654	0
Yearly	0.43	0		2.31		0	1.22	38,461	14,507	38,461	201

! And other days

09-5348.00 TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejorada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.
RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 1991; 242 Lateral from November 1978 through 1991.
REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.09	5.13	4.15	5.09	3.62	5.81	5.94	4.98	5.43	5.32	6.24	5.83
2	5.96	5.00	3.59	3.57	3.43	5.71	5.60	5.28	5.40	5.04	6.42	5.73
3	5.71	4.76	3.60	3.88	4.97	5.36	5.61	5.27	5.23	5.74	6.00	4.96
4	5.44	5.03	3.70	4.95	5.93	5.35	5.49	5.24	5.39	5.58	5.82	4.85
5	4.97	5.11	3.21	5.12	5.57	5.51	5.53	5.37	4.76	6.93	5.43	5.22
6	5.23	5.15	3.54	5.45	5.56	5.02	5.23	5.42	3.91	6.77	5.45	5.97
7	5.03	5.57	3.33	5.58	4.92	5.51	5.68	5.53	3.86	6.53	5.52	5.51
8	5.42	4.89	4.00	5.49	4.74	5.40	5.38	5.16	3.84	5.52	6.14	5.29
9	5.19	4.87	4.83	5.60	4.12	5.14	5.39	5.06	3.83	6.25	6.48	5.36
10	4.52	4.09	5.24	5.58	4.42	4.85	4.90	5.33	3.56	6.20	6.44	5.80
11	4.19	4.13	4.93	5.24	5.21	4.63	5.55	6.23	4.27	6.50	6.52	4.74
12	4.37	5.39	3.87	5.57	5.38	4.65	5.62	4.68	4.66	6.07	6.07	4.27
13	4.30	5.06	3.65	5.62	5.20	4.89	6.27	4.09	4.79	6.55	5.70	4.60
14	4.04	5.34	3.21	5.34	5.43	5.20	6.75	4.71	5.15	6.01	5.86	4.64
15	3.66	4.98	3.30	5.20	5.51	5.07	6.11	5.12	4.95	6.33	5.85	4.37
16	3.12	5.10	3.81	5.86	6.34	4.78	6.04	5.31	4.81	6.04	5.81	4.23
17	4.28	5.21	3.89	5.71	5.74	4.62	5.81	5.92	4.70	6.02	6.07	4.07
18	5.19	4.98	3.30	5.34	5.63	4.95	5.77	5.71	4.87	6.13	6.29	4.23
19	4.06	4.79	3.95	5.78	6.10	5.11	5.95	5.64	5.21	6.45	6.00	4.26
20	3.91	4.99	3.72	5.85	6.31	5.17	5.67	5.64	5.15	5.99	5.63	4.69
21	3.74	4.78	3.85	5.66	6.06	5.02	5.49	5.07	5.34	5.84	5.74	5.02
22	3.69	4.79	3.36	5.08	5.72	4.94	6.13	5.26	5.05	5.86	5.72	5.04
23	4.96	5.14	4.05	3.86	5.71	4.92	5.37	5.78	5.59	6.41	5.58	5.15
24	5.13	5.22	3.79	3.48	5.60	4.98	5.87	5.98	5.70	6.31	5.40	4.68
25	5.09	5.26	4.87	3.92	5.82	4.61	5.56	5.58	6.51	6.30	5.64	5.30
26	5.87	4.79	7.01	3.89	5.72	4.87	5.57	5.70	5.92	6.00	5.33	5.38
27	6.00	4.83	6.70	3.82	5.62	5.06	5.64	5.72	5.46	5.78	5.69	5.15
28	5.78	4.91	6.55	3.44	6.00	5.67	5.58	5.53	5.81	5.66	6.12	4.95
29	5.15		6.28	3.74	6.05	6.21	5.71	5.89	5.83	5.85	5.83	5.02
30	4.54		5.97	4.10	5.65	6.21	5.01	5.75	6.09	5.85	5.50	4.73
31	4.68		6.25		6.04		4.74	5.67		5.75		4.87
Sum	149.31	139.29	135.50	146.81	168.12	155.22	174.96	167.62	151.07	187.58	176.29	153.91

Current Year 1991 | Period 1935–1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			1	6.09	16	3.12	4.82	12,900	11,937	14,963	2,619
Feb.			7	5.57	10	4.09	4.97	12,035	11,815	15,998	2,495
Mar.			26	7.01	! 5	3.21	4.37	11,707	13,266	16,904	2,864
April			16	5.86	28	3.44	4.89	12,684	13,092	16,013	2,611
May			16	6.34	2	3.43	5.42	14,526	13,795	17,145	3,050
June			!29	6.21	25	4.61	5.17	13,411	12,749	15,505	3,115
July			14	6.75	31	4.74	5.64	15,117	12,876	15,320	3,610
Aug.			11	6.23	13	4.09	5.41	14,482	12,704	15,612	3,687
Sept.			25	6.51	10	3.56	5.04	13,052	12,527	15,357	3,210
Oct.			5	6.93	2	5.04	6.05	16,207	13,654	17,143	4,248
Nov.			11	6.52	26	5.33	5.88	15,231	12,692	15,680	4,202
Dec.			6	5.97	17	4.07	4.96	13,298	12,684	14,863	3,562
Yearly				7.01		3.12	5.22	164,650	153,791	183,801	39,274

ϕ Mean daily ! And other days

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 305 metres upstream from the southerly international boundary, 3.2 kilometres west of San Luis, Arizona, and 35 kilometres downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985 a permanent water-stage recorder was relocated on the left bank of the river about 24 metres upstream from the southerly international boundary.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1991; continuous record of gage heights, January 1947 through 1990. During 1991, the gage was inoperative. Records of gage height and discharge were derived from daily observations and discharge measurements. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured monthly flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 937 m3/sec on August 19, 1983; maximum gage height, 25.86 metres on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	.03	0	0	0	0	0	0	0	0	0	0	0
8	2.12	0	0	0	0	0	0	0	0	0	0	0
9	.82	0	0	0	0	0	0	0	0	0	0	0
10	7.96	0	0	0	0	0	0	0	0	0	0	0
11	1.36	0	0	0	0	0	0	0	0	0	0	0
12	.05	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	2.92	0	0	0	0	0	0	0	0	0	0	0
16	9.80	0	0	0	0	0	0	0	0	0	0	0
17	4.47	0	0	0	0	0	0	0	0	0	0	0
18	2.79	0	0	0	0	0	0	0	0	0	0	0
19	.13	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0		0	0	0	0	0	0	0	0	0	0
30	0		0	0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	32.45	0	0	0	0	0	0	0	0	0	0	0

Current Year 1991 | Period 1935-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	22.15	21.50	16	13.5	! 1	0	1.05	2,804	449,780	2,062,379	0
Feb.	21.50	21.50	! 1	0	! 1	0	0	0	362,225	1,708,370	0
Mar.	21.50	21.50	! 1	0	! 1	0	0	0	289,830	1,390,132	0
April	21.50	21.50	! 1	0	! 1	0	0	0	192,275	935,227	0
May	21.50	21.50	! 1	0	! 1	0	0	0	271,770	1,430,837	0
June	21.50	21.50	! 1	0	! 1	0	0	0	237,426	1,455,506	0
July	21.50	21.50	! 1	0	! 1	0	0	0	206,219	1,821,962	0
Aug.	21.50	21.50	! 1	0	! 1	0	0	0	221,947	2,103,318	0
Sept.	21.50	21.50	! 1	0	! 1	0	0	0	247,714	1,956,768	0
Oct.	21.50	21.50	! 1	0	! 1	0	0	0	294,172	2,144,909	0
Nov.	21.50	21.50	! 1	0	! 1	0	0	0	341,746	1,761,409	0
Dec.	21.50	21.50	! 1	0	! 1	0	0	0	418,710	2,268,370	0
Yearly	22.15	21.50		13.5		0	0.09	2,804	3,533,814	15,656,495	1,398

! And other days

09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY – STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
2	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
3	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
4	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
5	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
6	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
7	21.51	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
8	21.69	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
9	21.61	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
10	21.97	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
11	21.70	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
12	21.54	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
13	21.51	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
14	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
15	21.69	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
16	22.04	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
17	21.86	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
18	21.77	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
19	21.54	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
20	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
21	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
22	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
23	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
24	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
25	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
26	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
27	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
28	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
29	21.50		21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
30	21.50		21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
31	21.50		21.50		21.50		21.50	21.50		21.50		21.50
Avg.	21.58	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50

09-5333.00 WELLTON-MOHAWK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 24 metres upstream from the southerly land boundary, 168 metres east of the Colorado River, and 2.9 kilometres west of San Luis, Arizona. The zero of the gage has not been determined.
RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 1991.
REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Wellton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.95	6.20	6.60	6.15	6.12	0.01	6.09	5.58	5.58	5.47	5.18	5.18
2	6.06	6.26	6.74	6.00	6.09	.01	6.12	5.64	5.49	5.41	5.18	5.32
3	6.09	6.09	6.49	6.17	5.83	.02	6.12	5.47	5.35	5.64	5.32	5.07
4	6.09	6.15	6.57	5.86	5.83	.02	6.06	5.38	5.24	5.66	5.52	4.81
5	6.40	6.03	6.60	5.64	6.03	.03	5.95	5.38	5.32	5.66	5.52	4.76
6	6.40	5.35	6.51	6.09	6.03	1.17	5.81	5.30	5.38	5.55	5.38	5.01
7	6.32	5.35	6.60	6.15	5.98	5.58	5.64	5.27	5.24	5.52	5.38	5.07
8	6.26	5.49	6.54	6.12	6.09	5.92	5.61	5.35	5.21	5.55	5.18	5.07
9	6.20	5.52	6.46	5.95	5.92	6.09	5.83	5.41	5.13	5.47	5.47	5.13
10	6.20	5.44	6.26	5.86	5.83	6.20	5.86	5.44	5.47	5.52	5.49	5.21
11	6.32	5.66	6.37	5.78	5.72	5.83	5.58	5.41	5.72	5.66	5.30	5.30
12	6.00	5.58	6.37	5.92	5.72	5.89	5.55	5.38	5.75	5.66	5.18	5.35
13	6.00	5.35	6.34	5.89	5.92	6.09	5.78	5.21	5.69	5.58	5.38	5.35
14	5.83	5.38	6.20	5.78	5.92	6.03	5.55	5.15	5.86	5.49	5.47	5.58
15	6.06	5.30	6.06	5.75	5.83	6.03	5.61	5.18	5.78	5.49	5.49	5.58
16	6.17	5.30	6.12	5.86	5.95	6.12	5.83	5.24	5.72	5.44	5.38	5.47
17	6.03	5.18	6.09	5.83	5.98	6.15	5.92	5.30	5.86	5.52	5.35	5.61
18	6.15	5.21	6.34	6.00	5.78	6.03	6.00	5.30	5.75	5.49	5.18	5.72
19	6.26	5.24	6.06	6.15	5.78	5.78	5.98	5.32	5.72	5.47	5.13	5.83
20	6.09	5.38	5.98	6.03	5.72	1.83	5.89	5.32	5.52	5.41	5.15	5.98
21	6.00	5.58	6.12	5.86	5.95	.54	5.72	5.18	5.55	5.41	5.15	5.75
22	5.92	5.64	6.00	5.92	6.00	2.75	5.55	5.13	5.81	5.61	5.21	5.64
23	5.83	5.58	6.03	5.95	5.86	5.58	5.47	5.15	5.58	5.69	5.13	5.55
24	6.15	5.61	6.06	6.00	6.00	5.69	5.47	5.13	5.41	5.58	5.15	5.64
25	6.34	5.66	6.12	5.92	5.21	5.69	5.44	5.38	5.32	5.52	5.18	5.58
26	6.34	5.69	6.17	5.83	2.02	5.78	5.55	5.61	5.35	5.55	5.30	5.49
27	6.09	6.34	6.23	5.89	.31	5.92	5.58	5.58	5.47	5.66	5.35	5.55
28	6.06	6.32	6.34	6.15	.18	6.09	5.55	5.61	5.52	5.61	4.81	5.69
29	6.00		6.15	6.26	.12	6.12	5.55	5.66	5.52	5.52	4.11	5.47
30	6.03		6.00	6.23	.05	6.06	5.72	5.49	5.52	5.32	5.24	5.49
31	6.06		6.15		.01		5.61	5.49		5.04		5.66
Sum	189.70	157.88	194.67	178.99	149.78	131.05	177.99	166.44	165.83	171.17	157.26	167.91

Current Year 1991 | Period 1977-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Volume-Thousands of Cubic Metres			
			High		Low	Average	Total	Average	Maximum	Minimum
	High	Low	Day		Day					
Jan.	0.65	0.57	11	6.88	14	5.41	6.12	16,390	15,288	21,638	7,412
Feb.	.63	.55	!27	6.51	18	5.07	5.64	13,641	13,951	18,374	8,506
Mar.	.65	.59	2	6.88	19	5.78	6.28	16,819	15,679	21,496	11,420
April	.62	.55	28	6.34	! 5	5.27	5.97	15,465	14,629	20,613	3,445
May	.61	.02	1	6.29	31	0	4.83	12,941	14,744	20,732	5,215
June	.59	.02	10	6.29	! 1	0	4.37	11,323	14,040	19,842	9,109
July	.60	.55	3	6.23	!22	5.38	5.74	15,378	15,133	22,235	10,279
Aug.	.57	.53	!28	5.78	22	5.04	5.37	14,380	15,421	22,444	10,677
Sept.	.58	.47	12	5.92	9	4.13	5.53	14,328	14,239	23,538	51.4
Oct.	.59	.53	22	5.92	31	4.90	5.52	14,789	14,937	23,600	23.9
Nov.	.58	.44	! 4	5.64	29	3.48	5.24	13,587	14,062	20,944	59.2
Dec.	.59	.52	20	6.03	5	4.64	5.42	14,507	14,948	22,518	7,990
Yearly	0.65	0.02		6.88		0	5.50	173,548	177,071	222,488	120,438

! And other days

09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETRE 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 1.0 kilometre downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 27 kilometres downstream from Morelos Dam, and 250 metres south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District of the Ministry of Agriculture and Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 1991.

REMARKS: The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal to a point called Kilometre 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexion was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1956 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	3,980	11,853	85,761	0
February	0	5,525	50,898	0
March	74.3	8,308	72,049	0
April	0	14,412	85,372	0
May	20.7	13,514	99,576	0
June	264	11,562	61,705	0
July	0	13,284	56,912	0
August	0	17,999	132,183	0
September	408	14,770	83,943	0
October	0	13,455	136,198	0
November	0	17,599	122,170	0
December	390	11,279	86,607	0
Yearly	5,137	152,072	628,347	0

09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETRE 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometre 18+251 (old Kilometre 38+000). The wasteway is located in the Colonia Bojorquez 1.3 kilometres upstream from the Sonora-Baja California railroad bridge, 5.9 kilometres downstream from the Miguel C. Rodriguez gaging station, and 45 kilometres downstream from the southerly international boundary.
RECORDS: The records are computed by the Ministry of Agriculture and Hydraulic Resources and based upon gate openings. Records available: January 1964 through 1991.
REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 3.0 metres wide. It discharges into a dirt canal 200 metres long with a total capacity of 13.0 m3/sec which discharges to the river.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1964 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	0	1,982	10,541	0
February	0	1,563	12,035	0
March	0	816	5,932	0
April	0	435	5,555	0
May	0	1,612	14,246	0
June	0	929	8,585	0
July	0	778	9,114	0
August	0	1,263	17,765	0
September	0	2,454	16,855	0
October	0	5,039	28,669	0
November	0	3,138	25,263	0
December	0	2,601	13,380	0
Yearly	0	22,610	103,228	0

STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in millions of cubic metres. The capacities indicated are usable capacities at the top of the spillway gates in closed position for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U.S. Geological Survey.

IN MILLIONS OF CUBIC METRES

	LAKE MEAD (Capacity 32,266.6)		LAKE MOHAVE (Capacity 2,232.6)		HAVASU LAKE (Capacity 764.0)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 35,263.2)	
Month	1991	Average 1935–1991	1991	Average 1951–1991	1991	Average 1939–1991	1991	Estimated Average
Jan.	24,744.8	22.739.6	2,087.0	2,052.5	680.3	682.3	27,512.1	25,474.4
Feb.	24,853.4	22,545.6	2,101.8	2,068.9	681.3	684.6	27,636.5	25,299.1
Mar.	24,731.3	22,237.4	2,169.7	2,070.1	749.7	703.7	27,650.7	25,011.2
April	24,487.0	22,289.7	1,995.8	2,056.2	729.7	739.7	27,212.5	25,085.6
May	24,184.8	23,123.1	2,022.9	2,126.7	745.8	744.0	26,953.5	25,993.8
June	23,986.3	24,360.7	1,962.5	2,015.4	742.3	740.6	26,691.1	27,116.7
July	23,767.9	24,530.3	1,866.3	1,865.8	723.1	727.3	26,357.3	27,123.4
Aug.	23,708.7	24,303.0	1,830.5	1,808.0	714.4	708.7	26,253.6	26,819.7
Sept.	23,723.5	24,044.9	1,937.8	1,773.6	685.3	702.1	26,346.6	26,520.6
Oct.	23,522.5	23,784.0	1,969.9	1,785.0	675.3	700.2	26,167.7	26,269.2
Nov.	23,536.0	23,593.0	2,011.8	1,869.8	686.4	688.8	26,234.2	26,151.6
Dec.	23,791.4	23,383.6	2,198.1	1,973.2	678.3	686.7	26,667.8	26,043.5
Avg.	24,086.5	23,411.2	2,012.8	1,955.4	707.7	709.1	26,807.0	26,075.7
Max.	24,853.4	!34,266.1	2,198.1	!2,230.1	749.7	! 849.5	27,650.7	! 35,934.1
Min.	23,522.5	*13,231.5	1,830.5	!!1,462.9	675.3	!! 94.9	26,167.7	!! 16,112.5

! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record
* Minimum end of month storage since 1940

SUSPENDED SILT - 1991

The following tables are based on determinations of gravimetric percentages of dry silt in water samples taken at each station by one of the following methods.

A. By lowering a D-43 depth integrating sampler at verticals located at centers of sections of equal discharge in the river cross section, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

B. By lowering a D-43 depth integrating sampler at verticals located at centers of each span of the service bridge across the Alamo Canal, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

C. By sampling at the stream surface with a separate bottle at each of three points, spaced 1/6, 1/2, and 5/6 of the stream width. The gravimetric percentage in each sample is determined, a coefficient of 1.10 is applied to the average of the three, and the product applied to the volume of the stream flow represented by that set of samples.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent
Jan. 3	0854	44.5	0.0015	Apr. 25	0715	84.4	0.0040	Aug. 22	0740	58.1	0.0496
10	0900	85.8	0.0015	May 2	0800	78.2	0.0718	29	0735	57.2	0.0029
17	0910	45.9	0.0043	9	0925	66.0	0.0036	Sep. 5	0735	37.1	0.0043
24	0920	46.4	0.0032	16	0725	36.2	0.0036	12	0800	36.5	0.0770
31	0805	54.4	0.0040	23	0819	37.1	0.0035	19	0740	36.2	0.0040
Feb. 7	0830	53.2	0.0051	June 6	0750	52.4	0.0022	26	0736	38.5	0.0034
14	0815	53.2	0.0400	13	0755	59.2	0.0019	Oct. 2	0740	27.8	0.0130
21	0814	53.2	0.0035	20	0740	74.8	0.0037	12	0750	28.0	0.0049
28	0815	53.8	0.0019	27	0747	80.1	0.0027	17	0740	26.9	0.0039
Mar. 7	0822	73.1	0.0058	July 3	0745	73.3	0.0035	24	0825	30.0	0.0045
14	0720	71.6	0.0067	11	0745	71.6	0.0498	31	0820	28.9	0.0025
21	0825	82.1	0.0110	18	0730	71.9	0.0033	Nov. 7	1000	32.0	0.0082
28	0733	81.3	0.0057	25	0800	71.1	0.0029	13	0900	33.1	0.0039
Apr. 4	0740	82.4	0.0059	Aug. 1	0740	70.0	0.0048	20	0835	31.4	0.0250
11	0745	86.1	0.0060	8	0745	62.9	0.0041	27	0835	33.7	0.0028
18	0805	88.9	0.0039	15	0810	62.0	0.0026	Dec. 5	0855	36.0	0.0026

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

Month	Monthly Weight Megagrams		Number of Samples	Gravimetric Percentages			*Silt Volume - Thousand Cubic Metres			
	Water	Silt		Average	Maximum Sample	Minimum Sample	Total 1991	Period 1952 - 1991		
								Average	Maximum	Minimum
Jan.	132,589,000	5,126	5	0.0039	0.0070	0.0021	3.8	10.5	62.6	0.3
Feb.	128,114,000	5,375	4	0.0042	0.0058	0.0029	4.0	11.2	73.8	1.1
Mar.	198,876,000	7,808	4	0.0039	0.0063	0.0007	5.7	46.3	190	3.3
April	220,925,000	7,795	4	0.0035	0.0056	0.0008	5.7	45.9	292	5.7
May	132,736,000	4,927	5	0.0037	0.0052	0.0021	3.6	13.9	76.2	1.9
June	167,417,000	4,650	4	0.0028	0.0052	0.0008	3.4	30.5	134	2.5
July	193,182,000	4,915	5	0.0025	0.0050	0.0009	3.6	42.3	192	3.6
Aug.	160,168,000	4,452	4	0.0028	0.0045	0.0007	3.3	41.1	167	3.3
Sept.	97,502,000	3,883	4	0.0040	0.0068	0.0021	2.9	18.2	79.8	2.3
Oct.	75,185,000	4,987	5	0.0066	0.0083	0.0054	3.7	6.3	59.4	.4
Nov.	81,942,000	3,882	4	0.0047	0.0068	0.0033	2.9	5.7	67.7	.3
Dec.	108,130,000	7,570	4	0.0070	0.0113	0.0019	5.6	8.5	29.2	1.3
Year	1,696,766,000	65,370	52	0.0041	0.0113	0.0007	48.0	280.0	998.0	47.0

* Volume calculated at 1.362 megagrams per cubic metre

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary m3/sec	Gravimetric Percent
Jan. 8	1142	3.26	0.0011								

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

CHEMICAL ANALYSES OF WATER SAMPLES
1991

The tables below are based on chemical analyses of samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

1991 Date	Time Standard	Streamflow Momentary m3/sec	Specific Conductance Microsiemens	pH Units	Hardness, Total (as CaCO3) mg/L	Hardness, Noncarbonate (as CaCO3) mg/L	Calcium ion (Ca), Dissolved mg/L	Magnesium ion (Mg), Dissolved mg/L
Jan. 2	0900	42.2	1,590	8.3	422.66	238.66	105.0	38.6
14	0900	65.1	1,590	8.3	426.84	238.84	107.0	38.4
Feb. 4	0830	53.8	1,450	8.1	385.71	215.71	96.2	35.0
19	0800	52.4	1,390	8.3	387.44	214.44	96.4	35.3
Mar. 4	0800	65.7	1,300	8.2	363.03	205.03	89.6	33.5
18	0745	79.3	1,320	8.3	369.47	209.47	91.7	33.8
Apr. 1	0800	95.1	1,270	8.3	356.07	199.07	88.0	22.8
15	0800	88.1	1,240	8.3	347.90	193.74	85.9	32.1
May 6	0830	71.6	1,280	8.3	354.65	196.65	87.1	33.0
20	0800	36.5	1,500	8.2	386.36	216.36	95.5	35.6
June 3	0815	48.4	1,410	8.3	382.42	214.42	94.1	35.5
17	0800	66.0	1,320	8.3	369.51	208.57	90.2	34.7
July 1	0830	72.5	1,350	8.3	374.68	209.68	92.1	34.8
15	0800	64.3	1,370	8.3	372.14	208.14	90.6	35.1
Aug. 5	0800	65.1	1,350	8.3	379.44	217.44	92.6	35.6
19	0800	55.5	1,390	8.3	415.63	252.63	102.0	38.7
Sept. 3	0800	36.2	1,460	8.2	398.66	228.66	97.4	37.4
16	0730	38.5	1,450	8.2	373.25	218.25	90.9	35.2
Oct. 7	0800	28.0	1,620	8.2	413.86	235.86	102.0	38.3
21	0730	27.2	1,620	8.1	423.86	241.86	105.0	38.9
Nov. 4	0730	29.5	1,630	8.2	410.49	223.49	99.2	38.7
18	0830	31.7	1,630	8.2	423.41	248.41	104.0	39.4
Dec. 2	0800	37.1	1,630	8.2	390.47	205.47	96.3	36.1
16	0800	39.6	1,510	8.2	425.15	242.15	105.0	39.2

1991 Date	Sodium ion (Na), Dissolved mg/L	Potassium ion (K) Dissolved mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl), Dissolved mg/L	Carbonate (as CO3) mg/L	Bicarbonate (as HCO3) mg/L	Nitrate (as NO3) mg/L	Solids Dissolved (Calculated) mg/L
Jan. 2	186	5.0	379	194	#	224	3.0	1,040
14	180	5.0	364	172	#	229	1.4	995
Feb. 4	157	4.7	308	160	#	207	2.1	879
19	149	4.7	314	154	#	211	2.0	873
Mar. 4	140	4.9	285	146	#	193	2.3	809
18	137	4.7	305	143	#	195	2.0	826
Apr. 1	128	4.7	308	128	#	192	1.6	796
15	122	4.5	276	124	#	188	1.6	750
May 6	130	4.6	293	128	#	193	1.6	784
20	154	4.6	307	168	#	207	2.0	882
June 3	144	4.6	298	149	#	205	2.2	841
17	142	4.7	324	133	#	196	1.3	830
July 1	148	4.8	279	144	#	201	1.9	816
15	154	4.9	329	146	#	200	1.4	872
Aug. 5	151	6.0	316	140	#	198	1.4	853
19	166	5.7	320	149	#	199	1.4	894
Sept. 3	168	5.1	333	161	#	207	1.8	921
16	159	4.7	328	153	#	189	1.5	879
Oct. 7	191	5.1	362	198	#	217	2.2	1,020
21	193	5.2	359	196	#	222	2.2	1,030
Nov. 4	185	5.0	357	201	#	228	2.2	1,020
18	189	5.0	346	195	#	214	2.2	1,000
Dec. 2	176	4.7	335	192	#	226	2.1	969
16	168	5.1	344	175	#	223	1.1	962

Missing record

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following tables show specific conductance of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the northerly international boundary by both Sections of the Commission and at the southerly international boundary by the United States Section. Determinations for the northerly international boundary were made by the Bureau of Reclamation and the United States Section of the Commission (jointly); and for the southerly international boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	* 1,540	1,390	1,330	1,270	1,240	* 1,430	1,350	1,290	* 1,430	1,610	1,590	* 1,620
2	1,590	* 1,410	* 1,330	1,240	1,270	* 1,410	1,310	1,320	* 1,440	1,620	* 1,600	1,630
3	1,530	* 1,420	* 1,320	1,250	1,260	1,410	1,280	* 1,330	1,460	* 1,600	* 1,620	1,620
4	1,460	1,450	1,320	1,320	* 1,270	1,310	* 1,280	* 1,340	1,450	1,580	1,630	1,630
5	* 1,440	1,400	1,360	1,250	* 1,280	1,310	1,290	1,350	1,440	* 1,590	1,610	1,640
6	* 1,420	1,480	1,370	* 1,250	1,280	1,290	* 1,310	1,350	1,210	* 1,600	1,590	1,660
7	1,410	1,420	1,400	* 1,240	1,300	1,300	* 1,320	1,390	* 1,250	1,620	1,610	* 1,640
8	1,410	1,430	1,400	1,240	1,300	* 1,330	1,330	1,290	* 1,300	1,600	1,630	* 1,610
9	1,450	* 1,430	* 1,380	1,220	1,260	* 1,350	1,300	1,300	1,340	1,620	* 1,630	1,590
10	1,550	* 1,420	* 1,370	1,240	1,340	1,380	1,250	* 1,310	1,360	1,620	* 1,620	1,590
11	1,550	1,420	1,350	1,220	* 1,350	1,330	1,250	* 1,330	1,370	1,600	* 1,620	1,520
12	* 1,570	1,400	1,290	1,220	* 1,360	1,280	1,270	1,340	1,480	* 1,600	1,620	1,320
13	* 1,580	1,390	1,320	* 1,220	1,380	1,280	* 1,310	1,320	1,470	* 1,600	1,580	1,430
14	1,590	1,410	1,310	* 1,230	1,440	1,240	* 1,340	1,270	* 1,460	* 1,600	1,560	* 1,460
15	1,610	1,420	1,280	1,240	1,490	* 1,270	1,370	1,310	* 1,450	1,600	1,580	* 1,480
16	1,680	* 1,420	* 1,300	1,220	1,510	* 1,290	1,310	1,340	1,450	1,630	* 1,600	1,510
17	1,650	* 1,410	* 1,310	1,230	1,500	1,320	1,290	* 1,350	1,500	1,640	* 1,610	1,600
18	1,640	* 1,400	1,320	1,180	* 1,510	1,230	1,310	* 1,360	1,520	1,650	1,630	1,670
19	* 1,620	1,390	1,290	1,200	* 1,520	1,230	1,270	1,390	1,500	* 1,640	1,630	1,630
20	* 1,600	1,400	1,280	* 1,220	1,500	1,210	* 1,270	1,350	1,490	* 1,630	1,640	1,660
21	* 1,580	1,380	1,270	* 1,240	1,480	1,220	* 1,270	1,320	* 1,470	1,620	1,640	* 1,680
22	1,560	1,420	1,280	1,250	1,470	* 1,230	1,270	1,320	* 1,460	1,260	1,750	* 1,710
23	1,550	* 1,410	* 1,290	1,230	1,480	* 1,240	1,280	1,300	1,440	1,620	* 1,710	1,730
24	1,510	* 1,400	* 1,290	1,220	1,470	1,250	1,260	* 1,320	1,480	1,620	* 1,670	1,660
25	1,480	1,390	1,300	1,220	* 1,470	1,250	1,260	* 1,330	1,480	1,610	1,630	* 1,680
26	* 1,470	1,390	1,300	1,220	* 1,470	1,240	1,290	1,340	1,520	* 1,590	1,620	1,710
27	* 1,470	1,390	1,320	* 1,240	* 1,460	1,240	* 1,290	1,330	1,530	* 1,580	1,610	1,720
28	1,460	1,400	1,300	* 1,260	1,460	1,270	* 1,280	1,320	* 1,520	1,560	* 1,600	* 1,690
29	1,410		1,300	1,280	1,480	* 1,300	1,280	1,330	* 1,510	1,580	1,590	* 1,650
30	1,410		* 1,290	1,200	1,450	* 1,330	1,280	1,420	1,510	1,610	* 1,600	1,620
31	1,430		* 1,270		1,440		1,270	* 1,430		1,620		1,650

* Estimated

SPECIFIC CONDUCTANCE OF WATER SAMPLES

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,640	1,520	1,500	1,310	1,350	1,390	1,400	1,290	1,510	1,660	1,630	1,640
2	1,620	1,510	1,350	1,300	1,250	1,410	1,410	1,370	1,500	1,660	1,630	1,680
3	1,520	1,510	1,340	1,270	1,290	1,410	1,410	1,340	1,490	1,660	1,680	1,680
4	1,510	1,580	1,340	1,420	1,330	1,400	1,340	1,370	1,490	1,670	1,670	1,680
5	1,510	1,580	1,420	1,400	1,370	1,400	1,340	1,380	1,490	1,670	1,640	1,700
6	1,510	1,550	1,390	1,360	1,370	1,350	1,320	1,380	1,230	1,680	1,540	1,700
7	1,510	1,520	1,470	1,360	1,390	1,350	1,340	1,410	1,340	1,680	1,640	1,700
8	1,510	1,490	1,470	1,360	1,350	1,320	1,330	1,330	1,370	1,660	1,650	1,700
9	1,450	1,490	1,450	1,310	1,320	1,380	1,390	1,340	1,390	1,670	1,660	1,680
10	1,590	1,530	1,470	1,310	1,340	1,380	1,320	1,330	1,310	1,670	1,660	1,640
11	1,590	1,540	1,380	1,310	1,340	1,400	1,300	1,390	1,310	1,660	1,650	1,590
12	1,590	1,520	1,380	1,310	1,440	1,380	1,300	1,390	1,520	1,640	1,620	1,390
13	1,630	1,430	1,400	1,310	1,430	1,390	1,300	1,340	1,510	1,630	1,680	1,490
14	1,660	1,530	1,390	1,310	1,430	1,400	1,400	1,300	1,550	1,630	1,680	1,590
15	1,730	1,520	1,380	1,320	1,510	1,380	1,400	1,340	1,550	1,610	1,640	1,590
16	1,710	1,520	1,410	1,290	1,520	1,380	1,350	1,440	1,550	1,640	1,660	1,590
17	1,680	1,520	1,410	1,310	1,490	1,390	1,320	1,440	1,540	1,680	1,670	1,650
18	1,590	1,520	1,410	1,240	1,490	1,380	1,380	1,450	1,530	1,680	1,690	1,750
19	1,590	1,480	1,400	1,330	1,510	1,350	1,320	1,350	1,530	1,700	1,670	1,710
20	1,590	1,430	1,320	1,280	1,500	1,300	1,320	1,380	1,530	1,700	1,680	1,730
21	1,590	1,520	1,360	1,270	1,490	1,400	1,320	1,360	1,540	1,700	1,690	1,820
22	1,600	1,520	1,390	1,270	1,490	1,350	1,320	1,370	1,530	1,320	1,680	1,820
23	1,580	1,510	1,390	1,270	1,420	1,250	1,320	1,360	1,530	1,690	1,690	1,800
24	1,550	1,510	1,390	1,270	1,420	1,390	1,300	1,360	1,530	1,680	1,680	1,800
25	1,550	1,510	1,390	1,300	1,430	1,380	1,280	1,360	1,510	1,690	1,600	1,810
26	1,500	1,490	1,390	1,310	1,420	1,360	1,300	1,360	1,560	1,610	1,690	1,810
27	1,500	1,450	1,400	1,350	1,480	1,320	1,320	1,370	1,570	1,710	1,690	1,800
28	1,510	1,510	1,420	1,330	1,410	1,320	1,350	1,380	1,560	1,630	1,660	1,790
29	1,450		1,420	1,330	1,410	1,350	1,290	1,370	1,540	1,630	1,660	1,710
30	1,420		1,310	1,400	1,400	1,420	1,290	1,370	1,600	1,630	1,680	1,710
31	1,520		1,310		1,390		1,290	1,360		1,630		1,710

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1991

January					
8 1,430					

RAINFALL ON THE COLORADO RIVER WATERSHED
IN MILLIMETRES

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on following page in this bulletin.

IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	1991	Average 1931–1991	1991	Averages 1931–1991	1991	Averages 1931–1991	1991	Averages 1931–1991	1991	Averages 1978–1991
Jan.	18	9	11	10	8	11	25	10	25	27
Feb.	22	9	18	9	20	11	6	8	29	19
Mar.	23	6	13	5	22	10	19	7	74	26
April	0	2	0	2	0	3	0	3	0	6
May	0	1	0	0	0	1	0	0	0	4
June	0	0	0	0	T	1	0	1	0	0
July	0	1	0	2	2	5	T	6	2	13
Aug.	14	10	1	9	27	20	1	15	17	27
Sept.	18	9	14	7	10	10	5	8	10	13
Oct.	0	7	0	7	17	7	4	10	3	9
Nov.	1	5	9	5	0	7	3	5	15	15
Dec.	36	11	33	11	4	13	19	11	27	20
Yearly	132	70	99	67	110	99	82	84	202	179

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora		Delta, Baja California	
	1991	Average 1948–1991	1991	Averages 1926–1991	1991	Averages 1948–1991	1991	Averages 1949–1991	1991	Averages 1948–1991
Jan.	9	10	18	9	15	9	#	8	#	8
Feb.	8	5	14	8	9	5	#	7	#	6
Mar.	16	4	16	6	14	3	#	5	#	4
April	0	2	0	2	0	2	#	1	#	2
May	0	T	0	T	0	T	#	1	#	T
June	0	T	0	T	0	1	#	T	#	T
July	T	3	T	3	0	2	#	5	#	2
Aug.	0	10	6	10	0	6	#	11	#	7
Sept.	4	4	2	9	6	4	#	6	#	6
Oct.	T	6	0	8	3	7	#	9	#	8
Nov.	0	4	6	4	1	3	#	10	#	3
Dec.	8	9	31	18	26	7	#	15	#	11
Yearly	45	60	93	80	74	50		72		55

Month	Colonia Juarez, Baja California		Laguna Salada Baja California		Riito, Sonora		San Felipe, Baja California		El Centinela, Baja California	
	1991	Average 1954–1991	1991	Averages 1975–1991	1991	Averages 1959–1991	1991	Averages 1969–1991	1991	Averages 1978–1991
Jan.	#	12	#	7	#	7	0	7	T	6
Feb.	#	7	#	10	#	6	0	3	T	5
Mar.	#	7	#	2	#	4	9	3	0	4
April	#	2	#	2	#	1	0	1	0	0
May	#	1	#	1	#	T	0	1	0	0
June	#	T	#	0	#	1	0	1	0	T
July	#	5	#	4	#	2	0	3	1	5
Aug.	#	10	#	14	#	7	0	10	0	7
Sept.	#	7	#	15	#	11	0	8	1	1
Oct.	#	11	#	6	#	9	0	5	0	6
Nov.	#	6	#	3	#	5	0	5	0	1
Dec.	#	10	#	18	#	10	0	10	0	9
Yearly		62		121		66	9	62	2	43

T Trace # Missing record

LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1991.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	ϕ ELEV. (Metres)	RECORD BEGAN	OBSERVER
* Blythe, California	33º 37'	114º 36'	81.69	1909	State Division of Forestry
Brawley, California	32º 57'	115º 33'	30.48	1908	Agricultural Research Service
Bullhead City, Arizona	35º 07'	114º 36'	176.78	1980	Bullhead City Fire Department
El Centro, California	32º 46'	115º 34'	9.14	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32º 37'	114º 39'	58.22	1923	University of Arizona Experimental Farm

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	ϕ ELEV. (Metres)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32º 34'	115º 00'	**20.12	1948	# S. A. R. H.
Colonia Juarez, Baja California	32º 18'	115º 05'	14.94	1954	S. A. R. H.
Delta, Baja California	32º 21'	115º 11'	**11.89	1948	S. A. R. H.
El Centinela, Baja California	32º 35'	115º 45'	49.99	1978	S. A. R. H.
Laguna Salada, Baja California	32º 12'	115º 44'	2.14	1975	S. A. R. H.
Los Algodones, Baja California	32º 42'	114º 44'	35.05	1948	S. A. R. H.
Mexicali, Baja California	32º 40'	115º 28'	3.96	1926	S. A. R. H.
Riito, Sonora	32º 13'	115º 01'	13.11	1959	S. A. R. H.
San Felipe, Baja California	31º 01'	114º 51'	21.95	1969	S. A. R. H.
San Luis, R. C., Sonora	32º 28'	114º 47'	39.93	1949	S. A. R. H.

* Not shown on rainfall map
ϕ Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level
** Elevation obtained from International Boundary and Water Commission topographic maps
\# Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN
IN MILLIMETRES

Tabulated below are records of evaporation observed at one station in Arizona and two stations in Baja California and Sonora, Mexico. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 1.22 metres diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

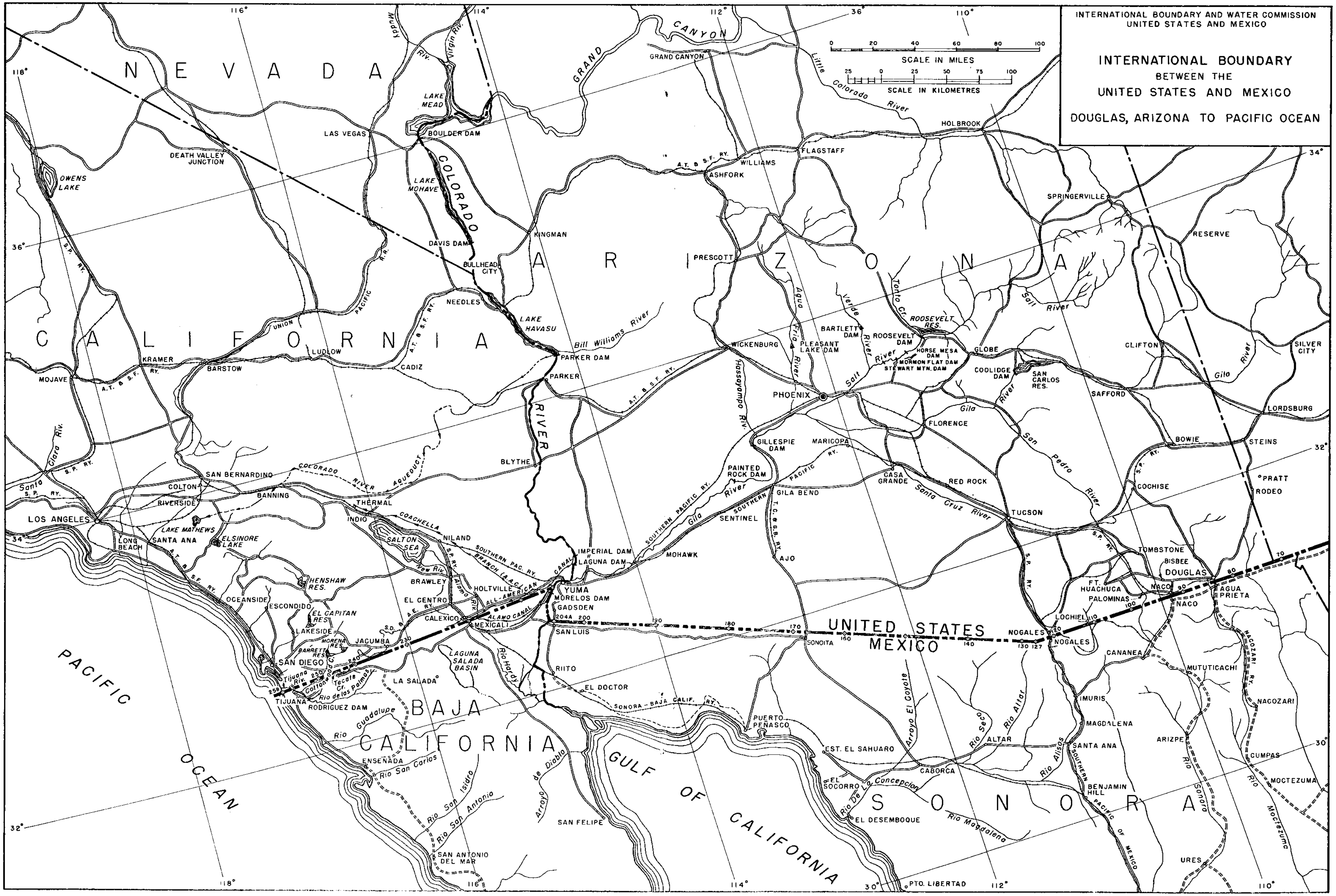
IN THE UNITED STATES

Month	Yuma Citrus Station, Arizona	
	1991	Average 1931–1991
Jan.	112	99
Feb.	130	121
Mar.	143	188
April	235	254
May	298	327
June	323	360
July	347	385
Aug.	303	338
Sept.	230	267
Oct.	186	190
Nov.	136	124
Dec.	77	93
Yearly	2,520	2,746

IN MEXICO

Month	Delta, Baja California		Colonia Juarez, Baja California	
	1991	Average 1948–1991	1991	Averages 1970–1991
Jan.	#	86	#	92
Feb.	#	112	#	112
Mar.	#	154	#	166
April	#	199	#	203
May	#	253	#	261
June	#	272	#	311
July	#	284	#	313
Aug.	#	263	#	273
Sept.	#	216	#	233
Oct.	#	152	#	177
Nov.	#	105	#	118
Dec.	#	91	#	80
Yearly		1,994		2,470

Missing Record


INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
INTERNATIONAL BOUNDARY
BETWEEN THE
UNITED STATES AND MEXICO
DOUGLAS, ARIZONA TO PACIFIC OCEAN
SCALE IN MILES
SCALE IN KILOMETRES
NEVADA
CALIFORNIA
ARIZONA
BAJA CALIFORNIA
SONORA
UNITED STATES
MEXICO
PACIFIC OCEAN
GULF OF CALIFORNIA
GRAND CANYON
COLORADO
RIVER
Little Colorado River
LAKE MEAD
BOULDER DAM
LAKE MOHAVE
DAVIS DAM
BULLHEAD CITY
NEEDLES
LAKE HAVASU
PARKER DAM
PARKER
Bill Williams River
BLYTHE
IMPERIAL DAM
LAGUNA DAM
YUMA
MORELOS DAM
GADSDEN
SAN LUIS
RIITO
EL DOCTOR
LAS VEGAS
DEATH VALLEY JUNCTION
OWENS LAKE
KINGMAN
PRESCOTT
FLAGSTAFF
WILLIAMS
ASHFORK
HOLBROOK
SPRINGERVILLE
RESERVE
WICKENBURG
PHOENIX
ROOSEVELT RES.
ROOSEVELT DAM
BARTLETT DAM
PLEASANT LAKE DAM
HORSE MESA DAM
MORMON FLAT DAM
STEWART MTN. DAM
GLOBE
COOLIDGE DAM
SAN CARLOS RES.
CLIFTON
SILVER CITY
SAFFORD
LORDSBURG
FLORENCE
GILLESPIE DAM
MARICOPA
PAINTED ROCK DAM
GILA BEND
SENTINEL
MOHAWK
AJO
CASA GRANDE
RED ROCK
TUCSON
BOWIE
STEINS
COCHISE
PRATT
RODEO
TOMBSTONE
BISBEE
DOUGLAS
AGUA PRIETA
NACO
FT. HUACHUCA
PALOMINAS
LOCHIEL
NOGALES
SONOITA
CANANEA
MUTUTICACHI
NACOZARI
IMURIS
MAGDALENA
SANTA ANA
ARIZPE
CUMPAS
MOCTEZUMA
BENJAMIN HILL
URES
ALTAR
CABORCA
EST. EL SAHUARO
EL SOCORRO
EL DESEMBOQUE
PTO. LIBERTAD
PUERTO PEÑASCO
SAN FELIPE
LOS ANGELES
LONG BEACH
SANTA ANA
RIVERSIDE
COLTON
SAN BERNARDINO
BANNING
LAKE MATHEWS
ELSINORE LAKE
HENSHAW RES.
OCEANSIDE
ESCONDIDO
EL CAPITAN RES.
LAKESIDE
MORENA RES.
BARRETT RES.
SAN DIEGO
TIJUANA
RODRIGUEZ DAM
JACUMBA
LA SALADA
LAGUNA SALADA BASIN
CALEXICO
MEXICALI
EL CENTRO
HOLTVILLE
BRAWLEY
NILAND
SALTON SEA
INDIO
THERMAL
MOJAVE
KRAMER
BARSTOW
LUDLOW
CADIZ
ENSENADA
SAN ANTONIO DEL MAR
COLORADO RIVER AQUEDUCT
ALL-AMERICAN CANAL
ALAMO CANAL
SOUTHERN PACIFIC RY.
A.T. & S.F. RY.
SONORA - BAJA CALIF. RY.

TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES CELSIUS

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few metres above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

Month	Blythe, California				Yuma Citrus Station, Arizana				Brawley, Califoria			
	1991				1991				1991			
	Mean	Max.	Min.	Average 1931-91	Mean	Max.	Min.	Average 1931-91	Mean	Max.	Min.	Average 1931-91
Jan.	11.1	24.4	-1.1	11.5	12.0	24.4	-0.6	11.8	12.3	25.0	-2.8	12.2
Feb.	15.5	28.3	2.2	14.1	16.6	28.9	3.3	13.9	16.9	30.6	1.1	14.6
Mar.	13.9	29.4	1.7	17.2	14.6	27.2	2.2	16.8	14.9	27.2	2.8	17.3
April	19.9	37.8	3.9	21.3	19.8	36.1	5.0	20.4	20.3	35.6	5.0	21.0
May	24.2	40.6	8.3	25.4	23.0	38.3	8.3	24.3	23.5	38.3	8.9	25.1
June	28.7	42.2	14.4	29.8	27.1	41.1	15.0	28.8	27.1	41.1	12.8	29.4
July	32.3	46.1	18.3	33.6	30.8	42.8	17.8	32.7	31.2	45.6	18.9	33.2
Aug.	32.7	46.1	20.0	32.7	32.2	42.8	20.0	32.3	31.5	42.8	18.3	32.9
Sept.	30.4	42.8	15.6	29.3	29.8	41.7	16.7	29.3	30.1	42.8	15.0	30.0
Oct.	25.2	41.1	2.2	22.9	25.2	40.6	2.8	23.1	25.9	42.2	3.3	23.9
Nov.	15.8	31.7	1.7	15.7	17.0	32.2	2.8	16.3	17.0	34.4	0.6	16.9
Dec.	12.3	22.2	-2.2	11.7	12.6	22.2	-2.2	12.4	12.3	22.8	-2.2	12.8
Yearly	21.8	46.1	-2.2	22.1	21.7	42.8	-2.2	21.8	21.9	45.6	-2.8	22.4

Month	El Centro, California				Bullhead City, Arizona			
	1991				1991			
	Mean	Max.	Min.	Average 1931-91	Mean	Max.	Min.	Average 1978-91
Jan.	13.3	25.6	0.6	12.3	11.5	21.7	1.7	11.9
Feb.	18.2	30.6	4.4	14.6	17.2	27.8	3.3	14.7
Mar.	15.9	28.3	5.6	17.3	14.3	26.7	2.8	17.6
April	20.9	35.6	6.1	20.9	20.6	34.4	6.1	22.3
May	24.0	37.8	10.6	25.1	25.3	40.0	10.6	27.0
June	27.8	40.6	15.0	29.5	29.9	43.3	15.0	32.4
July	31.8	43.9	20.6	33.2	34.8	47.2	21.7	35.1
Aug.	32.2	42.2	20.6	32.8	34.1	45.6	20.0	34.1
Sept.	30.2	41.1	16.7	29.8	31.1	43.9	17.8	30.3
Oct.	26.0	41.7	6.1	23.7	25.6	40.6	4.4	23.8
Nov.	17.3	33.9	3.9	16.8	17.6	31.7	3.3	16.6
Dec.	13.1	22.8	-0.6	12.7	12.3	20.0	0.0	11.8
Yearly	22.6	43.9	-0.6	22.4	22.9	47.2	0.0	23.1

IN MEXICO

Month	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1991		1948-1991		1991		1926-1991		1991		1948-1991	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	27.0	0	31.0	-5.0	26.0	2.0	34.0	-7.0	25.0	1.0	45.0	-9.0
Feb.	33.0	3.0	35.0	-2.0	30.0	8.0	34.0	-5.0	31.0	3.0	37.0	-6.0
Mar.	33.0	3.0	38.0	0	26.0	4.0	38.0	-1.0	27.0	3.0	45.0	-4.0
April	39.0	8.0	43.0	3.0	36.0	8.0	41.0	1.0	38.0	6.0	48.0	-9.0
May	43.0	10.0	47.0	6.0	39.0	13.0	47.0	6.0	41.0	9.0	51.0	1.0
June	43.0	14.0	52.0	11.0	44.0	17.0	49.0	9.0	43.0	14.0	57.0	6.0
July	47.0	18.0	50.0	13.0	46.0	22.0	48.0	13.0	45.0	19.0	56.0	7.0
Aug.	45.0	20.0	49.0	16.0	48.0	22.0	49.0	12.0	44.0	19.0	54.0	8.0
Sept.	46.0	16.0	50.0	10.0	46.0	16.0	50.0	9.0	44.0	15.0	57.0	4.0
Oct.	45.0	6.0	44.0	0	43.0	12.0	44.0	0	42.0	3.0	48.0	0.0
Nov.	36.0	3.0	38.0	-3.0	32.0	5.0	40.0	-2.0	35.0	1.0	46.0	0.0
Dec.	24.0	0	32.0	-5.0	22.0	14.0	32.0	-5.0	24.0	-1.0	36.0	-4.0
Yearly	47.0	0	52.0	-5.0	48.0	2.0	50.0	-7.0	45.0	-1.0	57.0	-9.0

TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES CELSIUS

IN MEXICO

Month	Riito, Sonora				San Felipe Baja California				San Luis, R. C., Sonora			
	1991		1949–1991		1991		1969–1991		1991		1949–1991	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	25.0	2.0	33.0	-7.0	20.0	3.0	37.0	-1.0	#	#	38.0	-7.0
Feb.	29.0	5.0	35.0	-6.0	30.0	5.0	39.0	0	#	#	43.0	-3.0
Mar.	29.0	3.0	38.0	-7.0	28.0	5.0	40.0	0	#	#	48.0	-2.0
April	38.0	7.0	43.0	2.0	34.0	10.0	45.0	1.0	#	#	46.0	2.0
May	40.0	12.0	46.0	5.0	38.0	12.0	49.0	5.0	#	#	49.0	5.0
June	40.0	14.0	51.0	7.0	42.0	16.0	51.0	10.0	#	#	52.0	7.0
July	45.0	17.0	60.0	11.0	44.0	20.0	51.0	10.0	#	#	52.0	10.0
Aug.	43.0	18.0	50.0	8.0	40.0	20.0	57.0	5.0	#	#	52.0	13.0
Sept.	41.0	17.0	48.0	4.0	39.0	19.0	52.0	3.0	#	#	48.0	10.0
Oct.	42.0	12.0	46.0	-1.0	39.0	10.0	47.0	-5.0	#	#	48.0	0
Nov.	34.0	2.0	48.0	-3.0	29.0	10.0	48.0	-6.0	#	#	45.0	-2.0
Dec.	27.0	1.0	30.0	-6.0	24.0	5.0	36.0	-2.0	#	#	39.0	-5.0
Yearly	45.0	1.0	60.0	-7.0	44.0	3.0	57.0	-6.0			52.0	-7.0

Month	Delta, Baja California				Colonia Juarez, Baja California				Laguna Salada, Baja California			
	1991		1948–1991		1991		1964–1991		1991		1975–1991	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	#	#	40.0	-3.0	#	#	33.0	-7.0	#	#	29.0	-8.0
Feb.	#	#	40.0	-2.0	#	#	39.0	-6.0	#	#	35.0	-3.0
Mar.	#	#	45.0	-2.0	#	#	36.0	-4.0	#	#	39.0	0
April	#	#	48.0	0	#	#	46.0	-1.0	#	#	42.0	2.0
May	#	#	54.0	0	#	#	47.0	2.0	#	#	46.0	4.0
June	#	#	56.0	2.0	#	#	50.0	4.0	#	#	49.0	10.0
July	#	#	57.0	7.0	#	#	50.0	7.0	#	#	50.0	12.0
Aug.	#	#	60.0	16.0	#	#	48.0	10.0	#	#	48.0	11.0
Sept.	#	#	57.0	4.0	#	#	50.0	4.0	#	#	48.0	9.0
Oct.	#	#	47.0	1.0	#	#	42.0	2.0	#	#	48.0	2.0
Nov.	#	#	50.0	0	#	#	40.0	-4.0	#	#	35.0	-5.0
Dec.	#	#	40.0	-3.0	#	#	37.0	-7.0	#	#	30.0	-7.0
Yearly			60.0	-3.0			50.0	-7.0			50.0	-8.0

Month	El Centinela, Baja California			
	1991		1977–1991	
	Max.	Min.	Max.	Min.
Jan.	28.0	3.0	30.0	1.0
Feb.	33.0	5.0	35.0	-4.0
Mar.	31.0	5.0	37.0	4.0
April	40.0	8.0	41.0	8.0
May	43.0	9.0	45.0	11.0
June	46.0	15.0	48.0	10.0
July	50.0	22.0	50.0	20.0
Aug.	47.0	22.0	47.0	18.0
Sept.	46.0	20.0	50.0	11.0
Oct.	46.0	3.0	46.0	3.0
Nov.	40.0	3.0	40.0	3.0
Dec.	26.0	0	29.0	-3.0
Yearly	50.0	0	50.0	-4.0

Missing record

IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

1991

The total drainage area within the Colorado River basin is about 637,100 square kilometres, of which 478,100 square kilometres lie above Imperial Dam and about 159,000 square kilometres, are below the dam. Of the area below Imperial Dam, 153,800 square kilometres are in the United States and about 5,180 square kilometres are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 150,700 squares kilometres, of which about 2,850 square kilometres are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation; and 3) those within the Imperial Valley; California, the data for which are furnished by the U. S. Bureau of Reclamation. The areas in Mexico include those in the Mexicali Valley located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Hectares
IN THE UNITED STATES:	
Imperial Dam	
Yuma Valley Diversion	18,460
Reservation Diversion	5,352
Yuma Mesa	7,294
Yuma Aux. Project Unit "B" (Yuma Mesa)	1,108
South Gila Valley	2,680
North Gila Valley	2,557
Wellton-Mohawk	24,302
Coachella Valley	24,224
Imperial Valley	196,464
Warren Act	32
Non-Project lands adjacent to Colorado River	5,083
Total in United States	287,556
IN MEXICO:	
Morelos Dam	
Mexicali Valley *	199,547
Total in United States and Mexico	487,103

* An estimated 34% of total hectares is served by pumping groundwater in the Mexicali Valley

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 11.3 kilometres east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and a few feet upstream from a 1.22-metre Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. Records available June 1942 through 1991.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 7.31 m3/sec (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.07	0.08	0.09	0.08	0.08	0.08	0.07	0.09	0.07	0.06	0.06	0.07
2	.08	.08	.09	.08	.08	.11	.07	.10	.05	.06	.06	.07
3	.08	.08	.09	.09	.07	.08	.07	.07	.06	.06	.06	.07
4	.08	.08	.09	.07	.08	.08	.07	.07	.06	.06	.06	.07
5	.09	.08	.09	.07	.08	.07	.07	.07	.06	.06	.06	.09
6	.09	.09	.09	.08	.07	.07	.09	.08	.06	.06	.05	.07
7	.08	.09	.09	.08	.07	.07	.07	.09	.05	.06	.05	.07
8	.08	.09	.09	.08	.06	.07	.07	.09	.06	.06	.05	.07
9	.10	.10	.09	.08	.06	.06	.09	.09	.05	.06	.06	.07
10	.14	.11	.07	.07	.06	.06	.07	.09	.06	.06	.06	.06
11	.12	.10	.09	.08	.07	.06	.08	.10	.06	.06	.06	.06
12	.10	.10	.09	.09	.07	.06	.08	.10	.06	.05	.06	.10
13	.08	.10	.09	.09	.07	.09	.06	.09	.06	.05	.08	.08
14	.09	.09	.09	.09	.06	.08	.06	.08	.05	.05	.09	.07
15	.09	.10	.08	.08	.07	.09	.06	.08	.06	.05	.07	.08
16	.10	.12	.08	.08	.08	.10	.06	.09	.06	.06	.07	.07
17	.07	.14	.09	.08	.08	.09	.09	.08	.08	.06	.06	.07
18	.07	.10	.09	.09	.07	.08	.08	.08	.08	.06	.06	.07
19	.07	.13	.09	.08	.07	.07	.08	.08	.06	.06	.06	.07
20	.08	.09	.09	.10	.07	.07	.08	.07	.06	.05	.06	.07
21	.09	.10	.09	.10	.08	.07	.06	.08	.06	.06	.06	.07
22	.09	.08	.09	.08	.07	.07	.06	.09	.06	.05	.05	.07
23	.09	.09	.10	.14	.09	.12	.07	.08	.06	.05	.06	.07
24	.08	.09	.10	.08	.08	.09	.09	.08	.06	.05	.06	.07
25	.10	.09	.10	.07	.07	.08	.09	.08	.06	.06	.07	.07
26	.10	.09	.10	.07	.10	.07	.07	.06	.06	.07	.07	.08
27	.09	.08	.09	.09	.10	.07	.11	.05	.06	.06	.07	.08
28	.09	.09	.09	.09	.10	.07	.09	.06	.05	.05	.07	.07
29	.09		.09	.09	.11	.06	.11	.05	.06	.06	.07	.07
30	.09		.09	.10	.10	.07	.12	.05	.05	.06	.07	.06
31	.08		.09		.08		.12	.06		.06		.06
Sum	2.75	2.66	2.79	2.55	2.40	2.31	2.46	2.43	1.79	1.78	1.89	2.22

Current Year 1991 | Period 1943-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.	0.20	0.13	10	0.14	! 1	0.07	0.09	238	361	3,441	122
Feb.	.20	.14	17	.14	! 1	.08	.10	230	330	3,481	111
Mar.	.16	.12	!23	.10	10	.07	.09	241	376	3,890	107
April	.20	.13	23	.14	! 4	.07	.09	220	396	2,741	120
May	.17	.12	29	.11	! 8	.06	.08	207	316	2,219	90.0
June	.18	.11	23	.12	! 9	.06	.08	200	304	2,080	75.2
July	.18	.11	!30	.12	!13	.06	.08	213	282	2,112	72.8
Aug.	.16	.10	! 2	.10	!27	.05	.08	210	330	2,062	81.0
Sept.	.14	.10	!17	.08	! 2	.05	.06	155	307	1,734	103
Oct.	.12	.10	26	.07	!12	.05	.06	154	325	2,276	76.0
Nov.	.15	.10	14	.09	! 6	.05	.06	163	337	2,566	77.0
Dec.	.16	0	12	.10	!10	.06	.07	192	323	2,080	98.7
Yearly	0.20	0		0.14		0.05	0.08	2,423	3,987	27,317	1,321

ϕ Mean daily ! And other days

10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the city of Calexico, California, 427 metres downstream (north) from the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.

RECORDS: Based on a continuous record of gage heights and current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 1991.

REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico, and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 43,172,000 m3 during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum mean daily discharge, 29.2 m3/sec on December 9, 1982; minimum mean daily discharge, 0.06 m3/sec on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.58	5.07	6.60	5.89	5.04	4.22	4.30	5.38	4.45	4.13	4.11	4.08
2	5.49	5.04	7.11	5.44	4.62	4.39	4.53	5.38	5.10	4.56	3.96	4.02
3	6.29	5.32	7.22	5.52	4.62	4.96	5.21	5.32	4.76	4.16	3.96	4.50
4	6.91	5.30	6.83	5.61	5.07	5.64	5.27	4.93	4.64	4.05	3.99	4.11
5	7.48	5.24	6.83	5.55	4.87	5.61	4.98	4.56	4.76	3.99	4.05	4.13
6	8.61	5.30	6.32	5.95	4.87	5.44	4.93	4.22	4.79	4.25	4.08	4.08
7	9.37	5.21	5.49	5.35	5.07	5.52	4.93	4.33	5.27	4.47	4.05	4.39
8	8.86	5.64	4.98	5.15	5.55	5.52	4.19	4.25	5.52	4.28	4.11	4.39
9	8.55	5.27	4.98	4.98	6.09	5.32	4.30	3.99	5.89	4.02	4.11	7.67
10	8.30	4.98	4.98	5.18	6.23	5.18	4.16	4.05	4.96	3.82	4.98	7.31
11	8.47	4.90	4.62	5.18	5.27	4.98	4.08	4.59	5.01	3.54	4.62	6.26
12	7.96	4.87	4.67	4.96	5.55	4.79	4.33	4.73	5.21	3.51	5.18	6.94
13	7.76	5.01	4.93	5.10	5.49	4.84	4.30	5.13	5.27	3.60	5.04	8.16
14	7.50	5.18	4.87	5.27	5.66	4.64	4.11	5.55	5.35	3.60	4.64	8.61
15	6.83	4.90	5.21	5.69	6.17	4.67	4.76	5.58	5.55	3.62	4.16	8.50
16	6.54	4.84	4.76	5.89	6.60	4.76	5.35	5.44	5.78	3.57	3.85	8.24
17	5.92	4.53	4.79	5.95	6.06	4.50	5.21	5.44	6.37	3.57	3.85	8.41
18	5.72	4.45	4.73	5.55	5.69	4.42	5.35	5.52	6.17	3.74	3.96	7.53
19	5.41	4.22	5.01	5.38	5.13	4.47	5.01	5.21	5.98	3.62	4.02	8.41
20	5.49	4.42	5.13	5.55	4.93	4.33	4.87	5.04	5.66	3.60	3.91	8.50
21	5.38	4.62	4.70	5.32	4.98	4.30	4.79	4.98	5.64	3.57	3.91	7.67
22	5.15	5.32	4.59	4.96	4.98	4.25	4.76	4.98	4.98	3.65	4.13	7.59
23	5.13	5.55	4.93	4.96	4.93	4.22	4.98	4.98	5.44	3.65	4.13	7.31
24	4.67	5.32	5.01	5.07	4.79	3.91	4.79	4.79	5.61	3.60	4.22	6.49
25	4.56	4.76	5.10	5.10	4.59	3.96	4.79	4.39	5.61	3.68	4.53	6.34
26	4.59	4.47	5.89	5.13	4.50	4.42	4.73	4.22	5.30	3.68	4.30	6.12
27	4.90	5.66	5.83	5.13	4.64	4.73	4.70	4.22	5.07	3.85	3.96	5.86
28	5.32	5.49	5.69	5.35	4.30	4.93	4.76	4.36	4.84	3.79	3.60	5.30
29	5.10		5.75	5.61	4.39	4.90	4.81	4.59	4.96	3.82	3.54	5.35
30	5.10		5.61	5.38	4.45	4.67	5.13	4.59	4.70	3.74	3.74	5.35
31	5.01		5.81		4.19		5.27	4.53		4.28		5.44
Sum	197.95	140.88	168.97	161.15	159.32	142.49	147.68	149.27	158.64	119.01	124.69	197.06

Current Year 1991 | Period 1943–1991

Month	Extreme Gage ** Metres High	Extreme Gage ** Metres Low	Extreme-Cubic Metres per Second ϕ High Day	ϕ High	ϕ Low Day	ϕ Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	12.15	12.66	7	9.37	25	4.56	6.39	17,103	12,397	27,387	2,160
Feb.	12.54	12.69	27	5.66	19	4.22	5.03	12,172	10,891	26,416	1,552
Mar.	12.37	12.65	3	7.22	22	4.59	5.45	14,599	12,229	31,213	1,243
April	12.51	12.61	! 6	5.95	!12	4.96	5.37	13,923	12,618	34,066	1,715
May	12.44	12.69	16	6.60	31	4.19	5.14	13,765	11,527	29,740	776
June	12.54	12.73	4	5.64	24	3.91	4.75	12,311	9,797	25,024	1,341
July	12.57	12.71	!16	5.35	11	4.08	4.76	12,760	10,418	28,368	1,008
Aug.	12.55	12.72	15	5.58	9	3.99	4.82	12,897	11,994	34,066	1,405
Sept.	12.46	12.67	17	6.37	1	4.45	5.29	13,706	11,279	29,251	2,214
Oct.	12.66	12.77	2	4.56	12	3.51	3.84	10,282	11,258	28,072	2,567
Nov.	12.59	12.77	12	5.18	29	3.54	4.16	10,773	10,624	25,310	3,063
Dec.	12.23	12.71	14	8.61	2	4.02	6.36	17,026	12,162	28,104	2,175
Yearly	12.15	12.77		9.37		3.51	5.12	161,317	137,194	330,444	30,310

ϕ Mean daily ! And other days ** Metres below mean sea level

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: A 3.5-metre Parshall flume installed by the State Commission of Public Services of Mexicali. Located 2.0 kilometres upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 91 centimetre diameter pipe that empties into Rivera Drain (Drain 134), which is 2.0 kilometres below the plant and 2.0 kilometres south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 1991 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 1991.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 1.4 kilometres upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 2.32 m3/sec on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 1991.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.02	0.05	0.05	0.05	0.03	0.05	0.05	0	0.05	0.03	0.05
2	.01	.02	0	.05	.03	.05	.05	.03	.02	.05	.03	.03
3	0	.02	.05	.05	.03	.05	.05	.05	.05	.05	.03	.02
4	.01	.02	.05	.03	.05	.05	.05	.05	.05	.05	.03	0
5	.02	.03	.05	.03	.05	.05	.05	.05	.08	.05	.02	0
6	.02	.03	.05	.03	.03	.05	.01	.05	.05	.05	.02	0
7	.02	.02	.03	.03	.05	.05	.05	.05	.05	.05	.03	0
8	.02	.02	.05	.05	.05	.07	.05	.05	.05	.05	.02	0
9	.01	.02	.05	.05	.05	.07	.05	.05	.05	.05	0	0
10	.02	.02	0	.05	.07	.05	.05	.05	.05	.05	.03	0
11	.02	.02	.03	.05	.05	.05	.05	.05	.05	.05	.03	0
12	.02	.02	.05	.05	.05	.05	.05	.05	.05	.05	.02	0
13	.01	.02	.05	.06	.05	.05	.05	.05	.05	.05	.02	0
14	.02	.03	.03	.07	.05	.06	.06	.05	.05	.05	.05	0
15	.02	.03	.03	.05	.05	.05	.05	.05	.05	.05	.05	0
16	.03	.02	.03	.05	.05	.05	.05	.05	.03	.05	0	0
17	.02	.02	.03	.05	.05	.03	.05	.05	.05	.05	.05	0
18	.02	.02	.03	.03	.05	.05	.05	.05	.05	.05	0	0
19	.02	0	.05	.02	.09	.07	.05	.03	.05	.05	.05	0
20	.02	.02	.05	.05	.05	.07	.05	.05	.05	.05	.05	0
21	.02	.05	.03	.06	.05	.05	.05	.05	.05	.05	.02	0
22	.02	0	.03	.03	.07	.05	.05	.05	.05	.02	.05	0
23	.02	.05	.02	.05	.05	.06	.05	.05	.05	.02	.03	0
24	.02	.03	.06	.05	.05	.05	.05	0	.05	.03	.05	0
25	.02	0	.03	.03	.05	.05	.05	0	.05	.03	.03	0
26	.01	.05	.06	.03	.05	.05	.05	0	.07	.02	.02	0
27	.02	.05	.05	.03	.05	.05	.05	.05	.05	.02	.05	0
28	0	.03	.02	.07	.05	.05	.05	.05	.05	.03	.03	0
29	.02		.05	.05	.05	.06	.05	.05	.07	.02	.02	0
30	.02		.02	.05	.03	.06	.05	.05	.03	.02	.02	0
31	.02		.05		.05		.05	.03		.03		0
Sum	0.52	0.68	1.18	1.35	1.55	1.58	1.52	1.34	1.45	1.29	0.88	0.10

Current Year 1991 | Period 1968–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			16	0.03	! 1	0	0.02	44.9	180	641	0
Feb.			!21	.05	!19	0	.02	58.8	116	384	0
Mar.			!24	.06	! 2	0	.04	102	229	1,074	41.5
April			!14	.07	19	.02	.05	117	221	532	84.0
May			19	.09	! 2	.03	.05	134	235	537	57.0
June			! 8	.07	! 1	.03	.05	137	213	504	25.9
July			14	.06	6	.01	.05	131	264	651	0
Aug.			! 1	.05	!24	0	.04	116	285	735	95.0
Sept.			5	.08	1	0	.05	125	267	677	71.7
Oct.			! 1	.05	!22	.02	.04	111	250	625	111
Nov.			!14	.05	! 9	0	.03	76.0	220	622	67.4
Dec.			1	.05	! 4	0	0	8.6	204	737	8.6
Yearly				0.09		0	0.04	1,161	2,729	6,610	1,160

ϕ Mean daily ! And other days

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS ENTERING THE UNITED STATES

DESCRIPTION: During 1991 the only flow to the New River in Mexico was waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Services of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 1991.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965);and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see previous page of this bulletin.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1956 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	44.9	1,089	10,803	7.8
February	58.8	770	8,981	7.8
March	102	558	3,219	26.8
April	117	506	3,940	19.9
May	134	340	1,450	11.2
June	137	439	6,994	0
July	131	652	12,644	0
August	116	633	5,103	0
September	125	482	3,996	25.9
October	111	635	4,285	10.4
November	76.0	658	4,668	0
December	385	1,041	10,720	0
Yearly	1,537.7	7,803	33,835	492

Starting January 1988, the north irrigation district watershed is included.

CHEMICAL ANALYSES OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the California Regional Water Quality Control Board – Colorado River Basin, Region–7. New River samples prior to 1985 collected and analyzed by the U.S. Geological Survey. Beginning December 1971, not all constituents analyzed.

Samples from the Alamo River are taken north of the international boundary at upstream end of box culvert under the All-American Canal. Flow at this point includes drainage flows across international boundary and flows from drain intercepts along toe of south bank of All-American Canal. Samples from New River are taken from the right bank at road bridge 137 metres north of international boundary. Records of sampling extend from April 1951 through 1991.

ALAMO RIVER

1991 Date	Time Std.	Water Temperature Deg C	pH Units	Oxygen Dissolved (DO) mg/L	Oxygen Demand Biochemical (BOD) 5 days mg/L	Coliform Fecal Colonies 100 mL	Sulfate ion (SO4) Dissolved mg/L	Turbidity (NTU)	Potassium ion(k) Dissolved mg/L
Mar 5	–	18	7.7	6.5	6	<200	993	17	24
Jul 29	1115	27	7.7	4.3	7	1,800	–	29	–

SAMPLE TYPE	COMPOSITE
DATE	03–05–91
PARAMETER	CONCENTRATION
Arsenic	BDL
Boron	1.0
Chromium	BDL
Copper	BDL
Lead	BDL
Zinc	BDL
Potassium	24.0 mg/l
Sulfate	993.0 mg/l
Turbidity	17 NTU

BDL – Below detection limit

NEW RIVER

1991 Date	Time Std.	*Streamflow Momentary CMS	Water Temperature Deg C	PH Units	Oxygen Dissolved (DO) mg/L	Specific Conductance Microsiemens	Turbidity NTU
Mar 14	1000	4.87	14	7.4	1.5	4,800	N/A
May 14	1000	5.64	20	7.8	2.2	5,120	28
Sep 16	1000	5.61	27	7.4	1.0	4,170	N/A

Note: Temperature, pH, D.O., and Specific Conductance – Data collected in field
* Flow reported by Imperial Irrigation District

SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE
DATE	03–14–91	05–14/15–91	09–16–91
PARAMETER	CONCENTRATION	CONCENTRATION	CONCENTRATION
Arsenic	BDL	BDL	BDL
Boron	1.0 mg/l	1.1 mg/l	0.9 mg/l
Cadmium	3.4 mg/l	BDL	BDL
Chromium	BDL	BDL	BDL
Copper	BDL	BDL	BDL
Lead	BDL	BDL	BDL
Phenol	0.006 mg/l	BDL	0.006 mg/l
MBAS	4.2 mg/l	1.02 mg/l	3.4 mg/l
Zinc	58 ug/l	64 ug/l	BDL
Total Cyanide	0.06 mg/l	BDL	BDL
Tannin & Lignin	BDL	BDL	1.1 mg/l
Total Phosphate	1.8 mg/l	1.6 mg/l	1.3 mg/l
Nitrate	3.4 mg/l	0.3 mg/l	0.4 mg/l
Nitrite	0.05 mg/l	0.03 mg/l	0.15 mg/l
Ammonia	6.8 mg/l	4.5 mg/l	3.3 mg/l
Total Dissolved Solids	2946 mg/l	3196 mg/l	2895 mg/l
Total Suspended Solids	60 mg/l	22 mg/l	40.4 mg/l
Volatile Suspended Solids	28 mg/l	N/A	23.2 mg/l

BDL – Below detection limit N/A – Data Not Available

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 24.9 kilometres northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 21,652 square kilometres. Zero of the gage is 76.2 metres below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 1991. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figtree John's Spring, about 35.4 kilometres northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of 0.30 metre higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

REMARKS: Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo and New River channels. The bottom of the sea is 84.6 metres below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during year, 69.43 metres below mean sea level. Minimum elevation during year, 69.71 metres below mean sea level. Extremes for period of record, maximum elevation 59.7 below mean sea level February 10 to March 29, 1907; minimum elevation since 1906, 76.7 metres below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN METRES BELOW MEAN SEA LEVEL - 1991

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	69.71	69.62	69.52	69.46	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
2	69.71	69.62	69.49	69.46	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
3	69.71	69.62	69.49	69.46	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
4	69.68	69.62	69.49	69.43	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
5	69.68	69.62	69.49	69.43	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
6	69.68	69.62	69.49	69.43	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
7	69.68	69.62	69.49	69.43	69.43	69.46	69.52	69.56	69.62	69.65	69.71	69.71
8	69.68	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
9	69.68	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
10	69.68	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
11	69.68	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
12	69.68	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
13	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.62	69.65	69.71	69.71
14	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.71
15	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.71
16	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.68
17	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.68
18	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.68
19	69.65	69.59	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.68
20	69.65	69.56	69.49	69.43	69.43	69.46	69.52	69.59	69.65	69.65	69.71	69.68
21	69.65	69.56	69.49	69.43	69.43	69.46	69.56	69.59	69.65	69.65	69.71	69.68
22	69.65	69.56	69.49	69.43	69.43	69.49	69.56	69.59	69.65	69.65	69.71	69.68
23	69.65	69.56	69.49	69.43	69.43	69.49	69.56	69.59	69.65	69.65	69.71	69.68
24	69.65	69.56	69.49	69.43	69.43	69.49	69.56	69.62	69.65	69.65	69.71	69.68
25	69.65	69.56	69.46	69.43	69.43	69.49	69.56	69.62	69.65	69.65	69.71	69.68
26	69.65	69.56	69.46	69.43	69.43	69.49	69.56	69.62	69.65	69.68	69.71	69.68
27	69.65	69.56	69.46	69.43	69.43	69.49	69.56	69.62	69.65	69.68	69.71	69.68
28	69.62	69.52	69.46	69.43	69.43	69.52	69.56	69.62	69.65	69.68	69.71	69.68
29	69.62		69.46	69.43	69.43	69.52	69.56	69.62	69.65	69.68	69.71	69.68
30	69.62		69.46	69.43	69.43	69.52	69.56	69.62	69.65	69.68	69.71	69.68
31	69.62		69.46		69.46		69.56	69.62		69.71		69.68
Avg.	69.66	69.59	69.48	69.43	69.43	69.47	69.53	69.59	69.64	69.66	69.71	69.69

Current Year 1991			Period 1935-1991		
Month	ϕ Extreme Elevation Metres		Elevation Metres		
	High	Low	# Average	# Maximum	! Minimum
Jan.	69.62	69.71	71.71	69.31	75.99
Feb.	69.52	69.62	71.62	69.22	75.83
Mar.	69.46	69.52	71.54	69.19	75.77
April	69.43	69.46	71.48	69.16	75.80
May	69.43	69.46	71.47	69.13	75.74
June	69.46	69.52	71.52	69.19	75.83
July	69.52	69.56	71.57	69.22	75.93
Aug.	69.56	69.62	71.63	69.25	76.02
Sept.	69.62	69.65	71.69	69.28	76.02
Oct.	69.65	69.71	71.71	69.31	76.14
Nov.	69.71	69.71	71.72	69.34	76.20
Dec.	69.68	69.71	71.68	69.34	76.08
Yearly	69.43	69.71	71.61	69.22	76.20

ϕ Mean daily # Mean monthly ! Reading near first day of month

Area and Capacity Table		
Elevation	Area	Capacity
Metres Below M.S.L.	Hectares	Thousand Cubic Metres
84.64	0	0
83.52	8,337	31,700
82.30	25,455	232,800
81.08	38,284	629,800
79.25	49,615	1,443,000
78.03	54,512	2,077,000
76.81	60,218	2,775,000
74.37	72,723	4,394,000
73.15	79,683	5,322,000
71.63	89,760	6,611,000
70.10	95,426	8,023,000
67.06	106,029	11,093,000
64.01	116,753	14,481,000
60.96	127,680	18,206,000

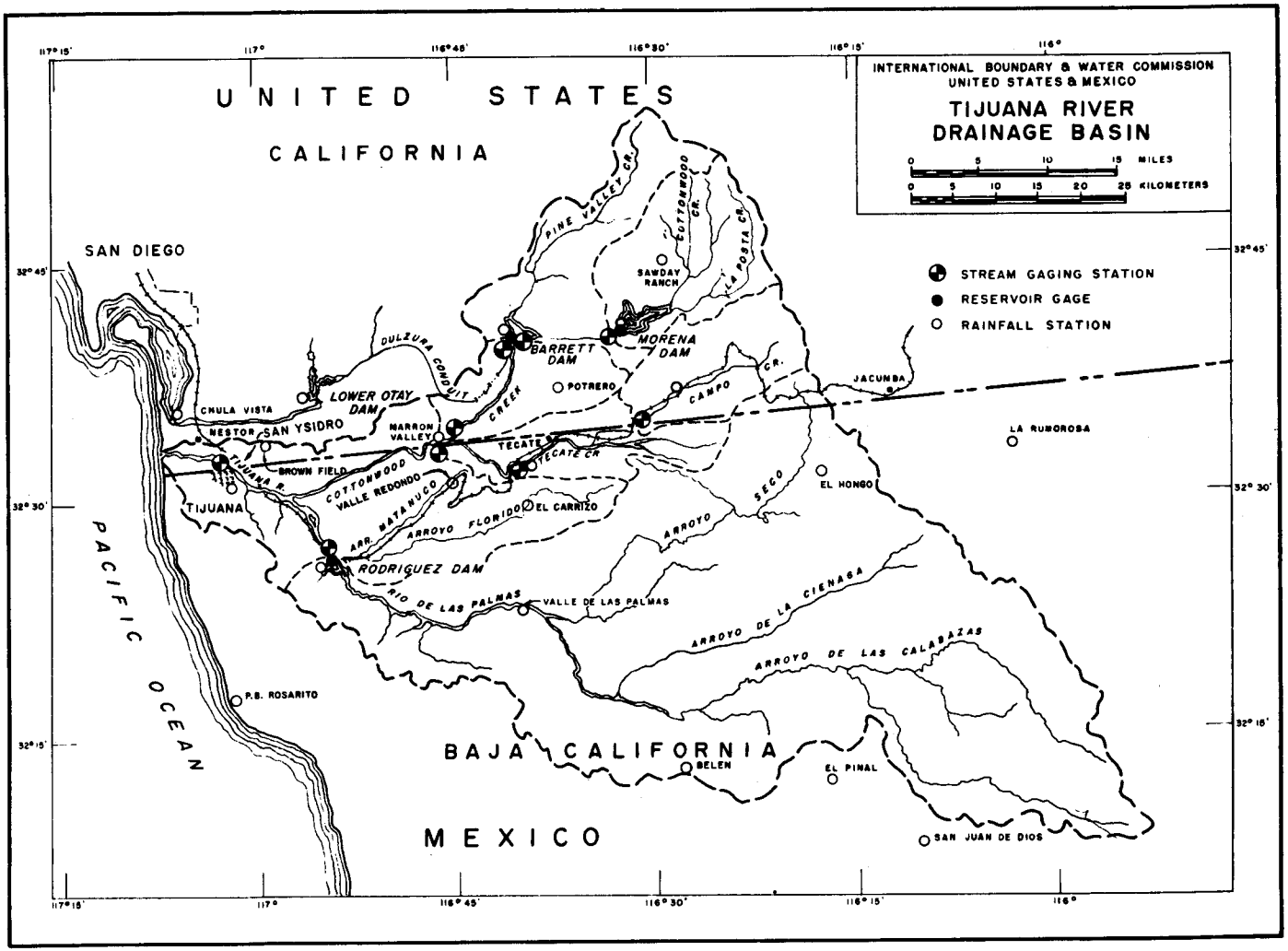
SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

NEW RIVER AT INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C – 1991

January		March		May		July		September		November	
2	4,800	6	5,400	8	6,600	3	5,900	4	5,600	6	6,800
9	4,000	13	6,000	15	5,900	10	6,200	11	5,900	13	6,500
16	4,200	20	6,400	22	5,900	17	6,200	18	5,500	20	6,400
23	5,200	27	6,300	29	6,300	24	5,400	25	5,300	27	6,600
30	6,000	April		June		31	5,600	October		December	
February		3	6,000	5	5,800	August		2	5,800	4	5,700
6	5,200	10	6,400	12	5,700	7	5,500	9	6,000	11	6,600
13	5,300	17	6,100	19	5,900	14	6,000	16	6,900	18	4,800
20	6,400	24	6,100	26	6,000	21	5,100	23	6,900	24	4,500
27	6,000	30	6,400			28	6,000	30	6,700	31	5,900


INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
TIJUANA RIVER
DRAINAGE BASIN
0 5 10 15 MILES
0 5 10 15 20 25 KILOMETERS
STREAM GAGING STATION
RESERVOIR GAGE
RAINFALL STATION
UNITED STATES
CALIFORNIA
MEXICO
BAJA CALIFORNIA
PACIFIC OCEAN
SAN DIEGO
CHULA VISTA
NESTOR
SAN YSIDRO
TIJUANA
TIJUANA R.
BROWN FIELD
LOWER OTAY DAM
DULZURA CONDUIT
BARRETT DAM
MORENA DAM
SAWDAY RANCH
POTRERO
JACUMBA
LA RUMOROSA
CAMPO
CR.
TECATE
TECATE CR.
NARROW VALLEY
COTTONWOOD
VALLE REDONDO
ARR. MATANUCO
ARROYO FLORIDO
EL CARRIZO
RODRIGUEZ DAM
RIO DE LAS PALMAS
VALLE DE LAS PALMAS
ARROYO SECO
EL HONGO
ARROYO DE LA CIENAGA
ARROYO DE LAS CALABAZAS
P.B. ROSARITO
BELEN
EL PINAL
SAN JUAN DE DIOS
PINE VALLEY CR.
COTTONWOOD CR.
LA POSTA CR.
117°15'
117°
116°48'
116°30'
116°15'
116°
32°45'
32°30'
32°15'
116°45'

11-0100.00 COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

DESCRIPTION: Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 2.9 kilometres upstream from the mouth of Hauser Creek, 13.7 kilometres upstream from Barrett Dam, and about 32.2 kilometres upstream from the international boundary. The zero of the gage is 878.56 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir water surface. Basic data were furnished by the city of San Diego, California. Records April 1911 through 1991.

REMARKS: Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1991 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 47.85 metres, gage datum. Reservoir capacity at spillway crest, 1948 survey, is 61,934,000 m3. The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the city of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

EXTREMES: Maximum monthly inflow since 1937, 55,845,000 m3, March 1983. Prior to 1937, maximum monthly inflow, 45,886,000 m3, January 1916; minimum no flow during parts of many years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1937 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	67.0	830	9,217	0
February	196	2,412	41,407	9.9
March	3,870	3,617	55,845	23.8
April	1,535	2,036	28,530	4.1
May	361	1,018	18,642	0
June	69.7	569	10,173	0
July	30.0	358	7,651	0
August	53.8	306	8,916	0
September	31.3	206	6,331	0
October	9.60	186	4,817	0
November	34.3	308	5,633	0
December	79.9	811	9,472	5.4
Yearly	6,338	12,657	177,579	149

11-0105.00 COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

DESCRIPTION: Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 1.3 kilometres downstream from the dam. Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.
RECORDS: Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the city of San Diego, California. Records available: January 1911 through 1991.
REMARKS: Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barrett Reservoir. There are no major diversions above Morena dam.
EXTREMES: Maximum monthly discharge since 1937, 55,615,000 m3, March 1983. Prior to 1937, maximum monthly discharge, 26,397,000 m3, February 1916; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1937 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	24.3	263	2,583	0
February	3,319	1,097	19,644	0
March	2,192	2,204	55,615	0
April	22.5	1,648	28,159	0
May	23.2	878	18,100	0
June	20.7	645	9,260	0
July	21.4	365	6,236	0
August	17.7	347	7,937	0
September	17.1	396	7,253	0
October	44.0	220	4,639	0
November	22.5	257	5,071	0
December	19.5	523	9,099	0
Yearly	5,744	8,843	168,432	0

11-0110.00 COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

DESCRIPTION: Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 13.7 kilometres downstream from Morena Dam, 1.6 kilometres downstream from the mouth of Pine Valley Creek, and about 19.3 kilometres upstream from the international boundary. Zero of gage is 440.78 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam, including rainfall on the reservoir water surface. Leakage, releases, and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage evaporation, and rainfall furnished by the city of San Diego, California. Records available: January 1921 through 1991. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

REMARKS: Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955 and were furnished by the city of San Diego, California. Capacity of reservoir at top of flash gates on spillway (gage height 51.47 metres) is 55,205,000 m3. Capacity at spillway crest (gage height 49.04 metres) is 46,811,000 m3. Dead storage, 887,000 m3 below lowest outlet (gage height 17.95 metres) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the city of San Diego, California.

EXTREMES: Maximum monthly discharge since 1937, 67,540,000 m3, February 1980. Prior to 1937, maximum monthly discharge, 67,595,000 m3 February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1937 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	78.2	983	6,076	6.4
February	18.5	3,171	67,539	9.4
March	9,110	5,226	56,370	17.4
April	2,201	2,467	26,680	12.6
May	243	1,041	10,251	0
June	96.3	477	4,818	0
July	186	229	2,081	0
August	187	143	735	0
September	149	147	936	0
October	127	120	796	0.1
November	80.1	221	1,531	0
December	120	652	6,845	2.1
Yearly	12,596	14,877	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.8 kilometre downstream from Barrett Dam on right bank of Dulzura Conduit 15.2 metres upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.
RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the city of San Diego, California. Records available: January 1909 through 1991.
REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 2.4 kilometres upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the city of San Diego. Prior to September 30, 1958, station was located 12.9 kilometres along the conduit from Barrett Dam, being reported as "Dulzura Conduit near Dulzura;" and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel loss in the reach from the reservoir to the gaging station.
EXTREMES: Since 1937: Maximum mean daily discharge, 1.56 m3/sec on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0.14	0	0	0	0	0	0	0	0	0
2	0	0	.14	0	0	0	0	0	0	0	0	0
3	0	0	.32	0	0	0	0	0	0	0	0	0
4	0	0	.48	0	0	0	0	0	0	0	0	0
5	0	0	.36	0	0	0	0	0	0	0	0	0
6	0	0	.34	0	0	0	0	0	0	0	0	0
7	0	0	.34	0	0	0	0	0	0	0	0	0
8	0	0	.32	0	0	0	0	0	0	0	0	0
9	0	0	.32	0	0	0	0	0	0	0	0	0
10	0	0	.32	0	0	0	0	0	0	0	0	0
11	0	0	.32	0	0	0	0	0	0	0	0	0
12	0	0	.32	0	0	0	0	0	0	0	0	0
13	0	0	.32	0	0	0	0	0	0	0	0	0
14	0	0	.32	0	0	0	0	0	0	0	0	0
15	0	0	.32	0	0	0	0	0	0	0	0	0
16	0	0	.32	0	0	0	0	0	0	0	0	0
17	0	0	.41	0	0	0	0	0	0	0	0	0
18	0	0	.41	0	0	0	0	0	0	0	0	0
19	0	0	.41	0	0	0	0	0	0	0	0	0
20	0	0	.41	0	0	0	0	0	0	0	0	0
21	0	0	.41	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0		0	0	0	0	0	0	0	0	0	0
30	0		0	0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	0	0	7.05	0	0	0	0	0	0	0	0	0

Current Year 1991 | Period 1937-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			! 1	0	! 1	0	0	0	503	2,899	0
Feb.			! 1	0	! 1	0	0	0	528	2,627	0
Mar.			4	.48	!22	0	.23	609	702	2,874	0
April			! 1	0	! 1	0	0	0	981	3,528	0
May			! 1	0	! 1	0	0	0	1,120	3,750	0
June			! 1	0	! 1	0	0	0	1,194	3,602	0
July			! 1	0	! 1	0	0	0	1,041	3,602	0
Aug.			! 1	0	! 1	0	0	0	970	3,478	0
Sept.			! 1	0	! 1	0	0	0	809	2,862	0
Oct.			! 1	0	! 1	0	0	0	673	3,022	0
Nov.			! 1	0	! 1	0	0	0	675	3,404	0
Dec.			! 1	0	! 1	0	0	0	608	2,843	0
Yearly				0.48		0	0.02	609	9,804	33,514	0

ϕ Mean daily ! And other days

11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located about 4.0 kilometres downstream from Barrett Dam and 0.8 kilometre upstream from Rattlesnake Canyon for measuring Barrett Dam spills; and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 305 metres (from topographic map).

RECORDS: Data furnished by the city of San Diego, California. Prior to January 1953, the records were furnished by the city of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, and the entire year of 1983. Spillway discharges included in the period record below were computed by the city of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1991. Storage began in Barrett Reservoir in January 1921.

REMARKS: Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included, inasmuch as all releases are made to Dulzura Conduit, which transports water outside the basin. Leakage is mainly through the spillway gates.

EXTREMES: Maximum monthly discharge since 1937, 111,775,000 m3 March 1983. Prior to 1937, maximum monthly discharge 47,366,000 m3, February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1937 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	0	226	7,460	0
February	24.7	2,123	86,736	0
March	228	4,076	111,775	0
April	0	2,321	45,417	0
May	0	983	28,287	0
June	0	448	13,503	0
July	6.20	166	5,311	0
August	3.70	112	4,206	0
September	2.50	10.3	368	0
October	22.2	4.8	152	0
November	12.3	94.2	5,100	0
December	0	145	6,058	0
Yearly	300	10,709	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 2.6 kilometres upstream from the international land boundary between the United States and Mexico, 1.3 kilometre upstream from the confluence with Tecate Creek, and 8.2 kilometres south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway, which is located 213 metres downstream from the gage. Zero of the gage is 173.55 metres above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1991.
REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 16.1 kilometres and 29.0 kilometres, respectively, upstream from this station.
EXTREMES: Maximum discharge 331 m3/sec February 21, 1980 (gage height 3.40 metres). Minimum discharge, no flow during part of each year.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	5.98	1.25	0.05	0	0	0	0	0	0	0
2	0	0	1.53	1.02	.04	0	0	0	0	0	0	0
3	0	0	.31	.88	.04	0	0	0	0	0	0	0
4	0	0	.17	.74	.04	0	0	0	0	0	0	0
5	0	0	.11	.62	.03	0	0	0	0	0	0	0
6	0	0	.08	.57	.02	0	0	0	0	0	0	0
7	0	0	.06	.48	.02	0	0	0	0	0	0	0
8	0	0	.04	.42	.02	0	0	0	0	0	0	0
9	0	0	.03	.40	.02	0	0	0	0	0	0	0
10	0	0	.03	.34	.02	0	0	0	0	0	0	0
11	0	0	.03	.31	.02	0	0	0	0	0	0	0
12	0	0	.03	.27	.02	0	0	0	0	0	0	0
13	0	0	.03	.25	.02	0	0	0	0	0	0	0
14	0	0	.05	.23	.01	0	0	0	0	0	0	0
15	0	0	.05	.21	.01	0	0	0	0	0	0	0
16	0	0	.04	.20	.01	0	0	0	0	0	0	0
17	0	0	.03	.18	.01	0	0	0	0	0	0	0
18	0	0	.02	.16	.01	0	0	0	0	0	0	0
19	0	0	.23	.14	.01	0	0	0	0	0	0	0
20	0	0	.74	.13	.01	0	0	0	0	0	0	0
21	0	0	5.72	.13	.01	0	0	0	0	0	0	0
22	0	0	2.69	.12	.01	0	0	0	0	0	0	0
23	0	0	1.22	.12	.01	0	0	0	0	0	0	0
24	0	0	.76	.13	.01	0	0	0	0	0	0	0
25	0	0	.74	.13	.01	0	0	0	0	0	0	0
26	0	0	4.47	.12	.01	0	0	0	0	0	0	0
27	0	0	17.1	.10	.01	0	0	0	0	0	0	0
28	0	0	8.92	.08	0	0	0	0	0	0	0	0
29	0		3.85	.07	0	0	0	0	0	0	0	0
30	0		2.46	.05	0	0	0	0	0	0	0	0
31	0		1.64		.01		0	0		0		0
Sum	0	0	59.16	9.85	0.51	0	0	0	0	0	0	0

Current Year 1991 | Period 1937–1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme–Cubic Metres per Second Day	ϕ High	Day	ϕ Low	Average	Volume–Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.			! 1	0	! 1	0	0	0	583	14,701	0
Feb.			! 1	0	! 1	0	0	0	2,769	85,134	0
Mar.			27	17.1	18	.02	1.91	5,111	4,546	109,418	0
April			1	1.25	30	.05	.33	851	2,688	49,635	0
May			1	.05	!28	0	.02	44.1	964	22,439	0
June			! 1	0	! 1	0	0	0	319	7,301	0
July			! 1	0	! 1	0	0	0	85.4	3,599	0
Aug.			! 1	0	! 1	0	0	0	67.2	1,850	0
Sept.			! 1	0	! 1	0	0	0	17.0	796	0
Oct.			! 1	0	! 1	0	0	0	9.1	291	0
Nov.			! 1	0	! 1	0	0	0	49.7	1,378	0
Dec.			! 1	0	! 1	0	0	0	197	3,169	0
Yearly				17.1		0	0.19	6,006	12,294	220,556	0

ϕ Mean daily ! And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.8 kilometre upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 5.6 kilometres southwest of Campo, California. Zero of gage is 664.13 metres above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey from October 1936 to September 1990. Records since October 1990 furnished by United States section of the Commission. Records available: October 1936 through 1991.
REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1.6 kilometre upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.
EXTREMES: Maximum discharge, 25.3 m3/sec, March 24, 1983 (gage height 1.64 metres present datum), from rating curve extended above 3.12 m3/sec on basis of velocity-depth relation and cross section area at the control. Minimum discharge, no flow during part of most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	5.13	0.17	0.05	0.02	0.02	0.01	0.01	0.01	0	0.01
2	0	.01	.45	.15	.05	.02	.01	.01	.01	0	0	.01
3	0	.01	.06	.13	.05	.01	.02	.01	.01	0	0	.01
4	0	.01	.01	.11	.05	.01	.02	.01	.01	0	0	.01
5	0	.01	.01	.10	.04	.02	.01	.01	.01	0	0	.01
6	0	.01	.01	.09	.04	.02	.02	.01	.01	0	0	.01
7	0	.01	.01	.08	.04	.01	.02	.01	.01	0	0	.01
8	0	.01	.01	.07	.04	.01	.01	.01	.01	0	0	.01
9	0	.01	.01	.07	.04	.02	.01	.01	.01	0	.01	.01
10	0	.01	.01	.07	.04	.01	.01	.01	.01	0	.01	.02
11	0	.01	.01	.07	.04	.02	.01	.01	.01	0	.01	.01
12	0	.01	.01	.06	.04	.02	.01	.01	.01	0	.01	.01
13	0	.01	.01	.06	.04	.02	.01	.01	.01	0	.01	.01
14	0	.01	.01	.06	.04	.02	.01	.01	.01	0	.01	.01
15	0	.01	.01	.06	.03	.02	.01	.01	.01	0	.01	.01
16	0	.01	.01	.06	.03	.02	.01	.01	.01	0	.01	.01
17	0	.01	.01	.06	.03	.01	.01	.01	.01	0	.01	.01
18	0	.01	.01	.06	.03	.01	.01	.01	.01	0	.01	.01
19	0	.01	.11	.05	.03	.02	.01	.01	.01	0	.01	.02
20	0	.01	.42	.05	.03	.02	.01	.01	.01	0	.01	.01
21	0	.01	1.13	.05	.03	.02	.01	.01	.01	0	.01	.01
22	0	.01	.28	.05	.03	.02	.01	.01	.01	.01	.01	.01
23	0	.01	.17	.05	.02	.02	.01	.01	.01	.01	.01	.01
24	0	.01	.12	.06	.02	.02	.01	.01	.01	.01	.01	.01
25	0	.01	.14	.05	.02	.02	.01	.01	.01	.01	.01	.01
26	0	.01	4.45	.05	.02	.02	.01	.01	.01	.01	.01	.01
27	0	.01	9.23	.05	.02	.02	.01	.01	.01	.01	.01	.01
28	0	.06	2.01	.05	.02	.02	.01	.01	.01	.01	.01	.01
29	0		.48	.05	.02	.02	.01	.01	.01	.01	.01	.01
30	0		.28	.05	.02	.02	.01	.01	.01	.01	.01	.01
31	0		.20		.02		.02	.01		.01		.01
Sum	0	0.32	24.81	2.14	1.02	0.53	0.37	0.31	0.30	0.11	0.22	0.33

Current Year 1991 | Period 1937-1991

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.			! 1	0	! 1	0	0	0	221	1,341	0
Feb.			28	.06	! 1	0	.01	27.6	439	5,288	0
Mar.			27	9.23	! 4	.01	.80	2,144	769	11,587	0
April			1	.17	!19	.05	.07	185	502	8,886	0
May			! 1	.05	!23	.02	.03	88.1	236	3,956	0
June			! 1	.02	! 3	.01	.02	45.8	113	2,234	0
July			! 1	.02	! 2	.01	.01	32.0	66.2	1,525	0
Aug.			! 1	.01	! 1	.01	.01	26.8	67.6	2,008	0
Sept.			! 1	.01	! 1	.01	.01	25.9	49.2	1,214	0
Oct.			! 1	.01	! 2	0	0	9.5	58.7	1,084	0
Nov.			! 9	.01	! 1	0	.01	19.0	113	1,522	0
Dec.			!10	.02	! 1	.01	.01	28.5	182	1,953	0
Yearly				9.23		0	0.08	2,632	2,817	38,639	0

ϕ Mean daily ! And other days

11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 9.0 kilometres upstream from its confluence with Cottonwood Creek, 17.0 kilometres upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 16.0 kilometres southeast of Tijuana, Baja California.

RECORDS: Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall. Records obtained by the Ministry of Agriculture and Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1991. Storage began in Rodriguez Reservoir on September 22, 1936.

REMARKS: Records of runoff represent all water reaching Rodriguez Reservoir, including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 115.85 metres above mean sea level; at top of spillway gates 125.00 metres above mean sea level. Reservoir capacity at spillway crest 92,370,000 m3; at top of spillway gates 138,000,000 m3.

EXTREMES: Maximum monthly inflow, 194,216,000 m3; February 1980; minimum, no flow during part of most years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1938 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	35.3	2,490	67,620	0
February	254	6,987	194,216	7.2
March	30,217	12,433	172,556	5.2
April	4,326	3,811	95,953	0
May	0.9	733	14,136	0
June	0	238	5,749	0
July	8.5	114	1,806	0
August	68.1	75.7	950	0
September	0	76.7	575	0
October	61.8	96.2	432	0
November	37.2	199	2,393	0
December	180	1,048	19,348	10.3
Yearly	35,189	28,302	381,515	313

11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.
RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1990 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1991.
REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana valley and for domestic use at the village by Rodriguez Dam and the city of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.
EXTREMES: Maximum monthly diversion, 2,421,000 m3, July 1944; minimum, no flow on several occasions since March 1941.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1991	PERIOD 1938 - 1991		
		AVERAGE	MAXIMUM	MINIMUM
January	0	445	1,969	0
February	0	447	1,763	0
March	0	517	1,990	0
April	0	625	1,976	0
May	0	777	2,067	0
June	253	863	2,290	0
July	704	919	2,421	0
August	850	853	2,293	0
September	1,137	741	1,884	0
October	771	655	1,996	0
November	1,139	558	1,928	0
December	1,244	525	1,969	0
Yearly	6,098	7,925	22,596	0

11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 1.1 kilometre downstream (north) from boundary, 1.8 kilometres upstream from the new Dairy Mart Road bridge, and 2.3 kilometres west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1991.
EXTREMES: Since May 1947: Maximum instantaneous discharge, 937 m3/sec, February 21, 1980; minimum discharge, no flow during many years since 1951.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.41	0.39	23.3	5.98	0.53	0.61	0.53	0.48	0.37	0.20	0	0
2	.44	.39	21.3	5.61	.53	.59	.53	.41	.37	.17	0	0
3	4.08	.35	23.2	5.24	.54	.52	.53	.37	.36	.11	0	0
4	4.08	.39	14.1	4.90	.52	.49	.57	.35	.45	.01	0	0
5	2.56	.40	2.92	1.79	.49	.47	.58	.33	.41	0	0	0
6	1.46	.35	1.61	1.60	.49	.46	.56	.35	.29	0	0	0
7	1.36	.34	1.33	1.53	.51	.45	.49	.39	.28	0	0	0
8	1.12	.39	1.63	1.52	.52	.42	.50	.40	.24	0	0	0
9	.94	.40	1.46	1.53	.51	.41	.51	.37	.33	0	0	0
10	.84	.42	1.16	1.40	.49	.48	.54	.36	.38	0	0	0
11	.76	.45	1.13	1.17	.49	.47	.58	.34	.42	0	0	0
12	.70	.46	.85	1.08	.48	.46	.59	.39	.38	0	0	0
13	.67	.49	2.48	.98	.48	.44	.63	.40	.43	0	0	0
14	.62	.43	1.27	1.05	.45	.43	.63	.39	.38	0	0	0
15	.57	.43	2.80	1.08	.44	.43	.62	.33	.36	0	0	0
16	.54	.45	1.24	1.05	.47	.42	.50	.39	.38	0	0	0
17	.53	.36	1.11	1.02	.48	.42	.48	.44	.38	0	0	0
18	.53	.35	1.03	.98	.51	.42	.48	.42	.48	0	0	0
19	.46	.39	10.9	.94	.54	.42	.55	.49	.37	0	0	0
20	.46	.40	10.3	.93	.60	.43	.50	.37	.43	0	0	0
21	.42	.39	17.5	.84	.60	.50	.51	.36	.42	0	0	0
22	.38	.38	13.4	.82	.57	.54	.51	.39	.36	0	0	0
23	.36	.42	10.4	.88	.57	.55	.50	.34	.37	0	0	0
24	.31	.40	8.81	.89	.54	.58	.53	.31	.30	0	0	0
25	.27	.43	8.13	.90	.52	.65	.51	.33	.21	0	0	0
26	.28	.43	15.4	.84	.49	.59	.51	.29	.16	0	0	0
27	.29	4.70	16.7	.75	.48	.57	.48	.34	.20	0	0	0
28	.36	10.6	11.0	.66	.49	.61	.47	.41	.19	0	0	0
29	.40		6.91	.62	.52	.61	.48	.35	.17	0	0	0
30	.38		6.12	.57	.49	.56	.50	.39	.16	0	0	.75
31	.36		6.26		.57		.96	.38		0		2.48
Sum	26.94	25.78	245.75	49.15	15.91	15.00	16.86	11.66	10.03	0.49	0	3.23

Current Year 1991 | Period 1947–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	12.91	11.92	3	15.9	26	0.19	0.87	2,328	3,444	89,355	0
Feb.	13.67	11.96	28	31.4	! 3	.26	.92	2,227	10,869	388,951	0
Mar.	13.46	11.99	3	26.8	!12	.73	7.93	21,233	14,907	362,019	0
April	12.41	11.98	1	6.54	30	.52	1.64	4,247	3,940	77,633	0
May	12.00	11.97	!20	.67	!14	.39	.51	1,375	2,133	52,545	0
June	12.02	11.94	!28	.88	7	.17	.50	1,296	644	11,960	0
July	12.19	11.95	31	2.95	3	.24	.54	1,457	501	11,400	0
Aug.	12.02	11.95	17	.61	6	.19	.38	1,007	679	21,083	0
Sept.	11.98	11.95	18	.58	!25	.08	.33	867	205	1,363	0
Oct.	11.97	11.92	4	.34	! 2	0	.02	42.3	279	3,346	0
Nov.	11.92	11.92	! 1	0	! 1	0	0	0	557	5,399	0
Dec.	12.19	11.92	31	2.48	! 1	0	.10	279	964	8,270	0
Yearly	13.67	11.92		31.4		0	1.15	36,358	39,122	734,832	0

! And other days

STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in thousands of cubic metres. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

Records for Morena and Barrett Reservoirs are obtained and furnished by the city of San Diego and the U. S. Geological Survey. Records for Rodriguez Reservoir obtained and furnished by the State of Baja California Commission of Public Services for Tijuana.

IN THOUSANDS OF CUBIC METRES

Month	MORENA RESERVOIR, CALIFORNIA (Capacity 61,933)		BARRETT RESERVOIR, CALIFORNIA (Capacity 55,211)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 138,003)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 255,147)	
	1991	Average 1937–1991	1991	Average 1937–1991	1991	Average 1937–1991	1991	Average 1937–1991
Jan.	5,150	22,881	5,940	16,511	2,850	38,993	13,940	78,385
Feb.	2,014	24,038	7,868	17,713	2,843	40,464	12,725	82,215
Mar.	3,920	25,317	18,070	20,141	30,824	45,683	52,814	91,141
April	5,310	25,407	20,236	20,728	36,890	45,961	62,436	92,096
May	5,469	25,127	20,415	20,186	36,088	45,365	61,972	90,678
June	5,341	24,468	20,249	19,304	35,192	44,062	60,782	87,834
July	5,158	23,802	19,981	18,376	33,988	42,375	59,127	84,553
Aug.	5,020	23,225	19,711	17,423	32,700	40,723	57,431	81,371
Sept.	4,882	22,605	19,501	16,821	31,076	39,559	55,459	78,985
Oct.	4,748	22,232	19,334	16,246	29,924	38,304	54,006	76,782
Nov.	4,697	22,108	19,224	15,831	28,468	37,914	52,389	75,853
Dec.	4,782	22,273	19,338	16,149	27,116	38,216	51,236	76,638
Avg.	4,708	23,624	17,489	17,952	27,330	41,468	49,527	83,044
Max.	5,469	!# 76,069	20,415	!* 56,641	36,890	! 138,486	62,436	! 263,471
Min.	2,014	!! 12	5,940	!! 131	2,843	!! 0	12,725	!! 1,559

\# March 31, 1941 – Prior to removal of spillway gates
* April 30, 1937 – Sandbags were placed on crest of spillway
! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED IN MILLIMETRES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	1991	Average 1906–1991	1991	Average 1907–1991	1991	Average 1951–1991	1991	Average 1950–1991	1991	Average 1900–1991
Jan.	28	93	26	85	41	68	0	81	34	75
Feb.	127	94	58	85	109	56	0	72	57	80
Mar.	297	89	352	82	163	73	0	79	309	73
April	5	42	3	38	0	30	1	37	1	34
May	0	15	1	14	0	8	0	10	0	12
June	0	2	0	2	0	1	0	1	0	2
July	15	10	11	3	18	1	34	15	16	13
Aug.	0	14	5	6	0	3	28	20	0	14
Sept.	5	10	2	7	0	7	0	12	9	9
Oct.	23	23	26	18	2	10	20	15	15	16
Nov.	0	40	8	38	0	36	9	45	8	35
Dec.	0	78	59	71	0	57	74	63	72	62
Yearly	500	510	551	449	333	350	166	450	521	425

Month	Chula Vista, California		Lower Otay Dam, California		Brown Field, California					
	1991	Average 1930–1991	1991	Average 1906–1991	1991	Average 1964–1991				
Jan.	15	45	36	51	N/A	N/A				
Feb.	34	43	34	39	N/A	N/A				
Mar.	135	44	197	56	N/A	N/A				
April	T	20	3	26	N/A	N/A				
May	0	6	1	10	N/A	N/A				
June	0	1	0	2	N/A	N/A				
July	5	0	5	1	N/A	N/A				
Aug.	T	2	7	3	N/A	N/A				
Sept.	T	5	2	6	N/A	N/A				
Oct.	0	9	15	10	N/A	N/A				
Nov.	0	30	3	34	N/A	N/A				
Dec.	45	41	51	40	N/A	N/A				
Yearly	234	246	354	278						

T Trace N/A Data Not Available

IN MEXICO

Month	El Pinal, Baja California		El Hongo, Baja California		Belen, Baja California		Tecate, Baja California		El Carrizo, Baja California	
	1991	Average 1964–1991	1991	Average 1980–1991	1991	Average 1965–1991	1991	Average 1946–1959 1961–1991	1991	Average 1980–1991
Jan.	39	73	21	41	41	60	38	65	24	41
Feb.	188	87	145	57	182	68	124	50	31	43
Mar.	218	93	184	72	#	67	197	64	132	62
April	2	40	0	18	4	27	4	27	1	18
May	0	9	0	4	2	4	2	7	0	3
June	0	1	0	2	0	2	0	2	0	1
July	14	19	14	17	4	4	32	4	24	6
Aug.	2	22	0	24	0	7	#	6	#	4
Sept.	18	19	10	9	32	11	#	4	#	5
Oct.	33	17	16	16	17	16	#	12	15	21
Nov.	16	49	4	38	21	42	#	37	#	41
Dec.	86	72	#	32	#	50	#	52	#	44
Yearly	616	502		350		363		345		310

Missing record

RAINFALL ON THE TIJUANA RIVER WATERSHED
IN MILLIMETRES

IN MEXICO

	Valle de Palmas, Baja California		Valle Redondo, Baja California		Rodriguez Dam, Baja California					
	1991	Average 1948–1991	1991	Average 1971–1991	1991	Average 1938–1991				
Jan.	17	41	#	55	27	40				
Feb.	118	32	#	57	98	37				
Mar.	148	39	#	61	138	42				
April	2	15	#	23	2	19				
May	0	3	#	6	T	3				
June	0	1	#	1	0	1				
July	17	2	#	2	3	1				
Aug.	#	5	#	4	0	3				
Sept.	#	6	#	8	0	6				
Oct.	#	8	#	19	11	10				
Nov.	#	22	#	46	1	25				
Dec.	#	29	#	44	39	39				
Yearly		195		331	319	223				

Missing record T Trace

LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1991.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	ϕ ELEV. (Metres)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32º 41'	116º 40'	494.69	1907	City of San Diego
Brown Field, California	32º 34'	116º 59'	156.97	1964	City of San Diego
Campo, California	32º 38'	116º 28'	801.62	1877	County of San Diego
Chula Vista, California	32º 36'	117º 06'	2.74	1930	Chula Vista Fire Department
Lower Otay Dam, California	32º 37'	116º 56'	164.59	1906	City of San Diego
Marron Valley, California	32º 34'	116º 46'	167.64	1951	County of San Diego
Morena Dam, California	32º 41'	116º 31'	937.26	1906	City of San Diego
Sawday Ranch, California	32º 45'	116º 29'	975.36	1950	William Tulloch

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	ϕ ELEV. (Metres)	RECORD BEGAN	OBSERVER
Belen, Baja California	32º 12'	116º 29'	555.04	1965	** S.A.R.H.
El Carrizo, Baja California	32º 29'	116º 42'	494.99	1980	S.A.R.H.
El Hongo, Baja California	32º 31'	116º 18'	960.12	1980	S.A.R.H.
El Pinal, Baja California	32º 11'	116º 17'	"1349.96	1964	S.A.R.H.
Rodriguez Dam, Baja California	32º 27'	116º 54'	120.09	1938	S.A.R.H.
Tecate, Baja California	32º 33'	116º 41'	480.06	1946	S.A.R.H.
Valle de Las Palmas, Baja California	32º 22'	116º 37'	280.11	1948	S.A.R.H.
Valle Redondo, Baja California	32º 31'	116º 45'	242.01	1971	S.A.R.H.

ϕ Elevation above mean sea level
** Ministry of Agriculture and Hydraulic Resources
" Estimated from topographic maps

EVAPORATION IN THE TIJUANA RIVER BASIN
IN MILLIMETRES

Tabulated below are records of evaporation observed at three stations in California and at two stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, city of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Tijuana River Watershed" in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan. October 1926 through 1991, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.

2. Morena Reservoir: October 1915 through December 1921, square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan and a land pan of the same dimensions. September 1926 through 1991, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.

3. Lower Otay Dam: January 1950 through 1991, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Lower Otay Dam, California			
	1991	Average 1916–1991	1991	Average 1921–1991	1991	Average 1950–1991		
Jan.	58	54	36	48				
Feb.	92	54	61	55				
Mar.	52	83	76	85				
April	125	118	87	118				
May	174	165	132	166				
June	176	213	139	204	Data Not Available			
July	198	244	150	241				
Aug.	190	226	152	226				
Sept.	169	180	118	184				
Oct.	132	126	97	129				
Nov.	80	82	61	81				
Dec.	31	58	36	50				
Yearly	1,477	1,603	1,145	1,587				

IN MEXICO

Month	Rodriguez Dam, Baja California		El Carrizo, Baja California	
	1991	Average 1939–1942 1946–1991	1991	Average 1980–1991
Jan.	56	105	126	134
Feb.	80	109	153	120
Mar.	76	115	142	151
April	119	141	162	191
May	156	130	227	223
June	164	192	254	274
July	158	217	260	294
Aug.	166	200	#	275
Sept.	130	168	#	236
Oct.	109	139	250	205
Nov.	94	112	#	150
Dec.	59	87	#	128
Yearly	1,367	1,723		2,343

Missing record

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES CELSIUS

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few metres above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations on Tijuana River Watershed" in this bulletin.

IN THE UNITED STATES

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	1991			Average 1931–1991	1991			Average 1951–1991	1991			Average 1931–1991
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	10.6	23.3	-2.2	9.5	8.6	22.8	-6.7	8.6	13.8	26.7	3.9	11.8
Feb.	14.7	30.0	-0.6	10.5	11.4	26.1	-5.0	9.2	15.1	26.7	6.1	12.6
Mar.	11.7	23.3	0.0	11.9	#	#	#	10.0	13.7	25.6	3.9	13.3
April	16.4	30.6	2.2	14.4	12.4	28.3	-3.3	12.1	16.2	28.3	7.8	14.8
May	18.9	32.2	5.6	17.1	13.9	32.8	-0.6	14.9	16.3	28.9	9.4	16.1
June	20.0	30.6	9.4	20.4	#	#	#	18.5	17.9	23.3	11.7	17.5
July	23.6	35.6	11.7	24.5	20.7	37.8	5.0	22.8	19.6	25.6	15.6	19.7
Aug.	24.4	38.3	10.6	24.5	22.1	38.9	3.3	22.7	20.9	35.6	15.6	20.5
Sept.	22.5	37.2	7.8	22.5	21.2	37.2	1.1	20.4	20.7	29.4	12.8	19.8
Oct.	20.0	37.2	2.8	17.9	17.8	37.2	-3.3	16.0	19.9	34.4	7.2	17.6
Nov.	16.4	31.7	1.1	13.3	12.4	30.0	-7.2	11.4	#	#	#	14.7
Dec.	11.7	24.4	-1.1	10.2	8.4	23.9	-7.2	8.8	13.9	26.7	2.8	12.6
Yearly	17.6	38.3	-2.2	16.4				14.6				15.9

Missing Data

IN MEXICO

Month	El Pinal, Baja California				El Hongo, Baja California				Belen, Baja California			
	1991		1964–1991		1991		1981–1991		1991		1965–1991	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	29.0	-4.0	29.0	-16.0	21.0	-2.0	25.0	-9.0	24.0	-1.0	34.0	-6.0
Feb.	31.0	3.0	31.0	-10.0	24.0	1.0	27.0	-6.0	29.0	1.0	32.0	-6.0
Mar.	29.0	-3.0	29.0	- 7.0	22.0	-2.0	29.0	-2.0	#	#	36.0	-4.0
April	33.0	1.0	33.0	- 8.0	28.0	0	31.0	-1.0	30.0	1.0	40.0	-3.0
May	34.0	0	34.0	- 4.0	32.0	1.0	38.0	1.0	31.0	3.0	40.0	0
June	38.0	3.0	43.0	- 4.0	34.0	6.0	41.0	2.0	31.0	6.0	43.0	3.0
July	38.0	7.0	44.0	0	38.0	8.0	42.0	7.0	33.0	10.0	45.0	4.0
Aug.	38.0	9.0	44.0	0	38.0	9.0	41.0	3.0	38.0	11.0	45.0	5.0
Sept.	36.0	6.0	45.0	- 4.0	38.0	7.0	39.0	3.0	37.0	8.0	44.0	1.0
Oct.	40.0	-1.0	40.0	- 5.0	34.0	1.0	35.0	0	38.0	4.0	40.0	-6.0
Nov.	35.0	-3.0	35.0	-10.0	28.0	-3.0	29.0	-2.0	30.0	1.0	34.0	-4.0
Dec.	23.0	-3.0	29.0	- 4.0	#	#	27.0	-8.0	#	#	33.0	-7.0
Yearly	40.0	-4.0	43.0	-16.0			42.0	-9.0			45.0	-7.0

Month	Tecate, Baja California				El Carrizo, Baja California				Valle de Palmas, Baja California			
	1991		1946–1991		1991		1980–1991		1991		1948–1991	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	24.0	-1.0	38.0	-9.0	23.0	5.0	30.0	-1.0	25.0	-2.0	33.0	-11.0
Feb.	29.0	1.0	38.0	-8.0	29.0	7.0	34.0	-2.0	30.0	1.0	37.0	- 5.0
Mar.	25.0	0	36.0	-5.0	23.0	4.0	32.0	-4.0	25.0	1.0	38.0	- 2.0
April	32.0	0	39.0	-2.0	28.0	4.0	41.0	4.0	32.0	0	41.0	- 2.0
May	32.0	4.0	42.0	2.0	30.0	5.0	42.0	5.0	33.0	4.0	44.0	2.0
June	31.0	5.0	44.0	0	29.0	9.0	42.0	9.0	34.0	7.0	48.0	4.0
July	38.0	10.0	46.0	2.0	33.0	12.0	43.0	8.0	39.0	8.0	49.0	7.0
Aug.	#	#	47.0	1.0	#	#	45.0	10.0	#	#	48.0	5.0
Sept.	#	#	46.0	2.0	#	#	41.0	9.0	#	#	47.0	4.0
Oct.	#	#	41.0	-3.0	40.0	8.0	38.0	6.0	#	#	43.0	0
Nov.	#	#	36.0	-3.0	#	#	35.0	4.0	#	#	38.0	- 7.0
Dec.	#	#	36.0	-5.0	#	#	32.0	-3.0	#	#	35.0	- 6.0
Yearly			47.0	-9.0			45.0	-4.0			49.0	-11.0

Missing Data

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES CELSIUS

IN MEXICO

Month	Valle Redondo, Baja California				Rodriguez, Baja California							
	1991		1974–1991		1991		1938–1991					
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.				
Jan.	#	#	32.0	-6.0	26.0	3.0	32.0	-3.0				
Feb.	#	#	35.0	-1.0	30.0	4.0	34.0	0				
Mar.	#	#	32.0	-3.0	26.0	3.0	38.0	0				
April	#	#	39.0	0	30.0	5.0	40.0	2.0				
May	#	#	41.0	4.0	31.0	7.0	39.0	3.0				
June	#	#	45.0	5.0	29.0	10.0	42.0	8.0				
July	#	#	44.0	9.0	31.0	12.0	40.0	8.0				
Aug.	#	#	45.0	8.0	36.0	12.0	41.0	10.0				
Sept.	#	#	46.0	-7.0	35.0	11.0	43.0	8.0				
Oct.	#	#	46.0	4.0	38.0	7.0	42.0	1.0				
Nov.	#	#	36.0	-2.0	32.0	3.0	37.0	-1.0				
Dec.	#	#	33.0	-1.0	26.0	2.0	34.0	-3.0				
Yearly			46.0	-6.0	38.0	2.0	43.0	-3.0				

Missing Data

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG TIJUANA RIVER AND TRIBUTARIES

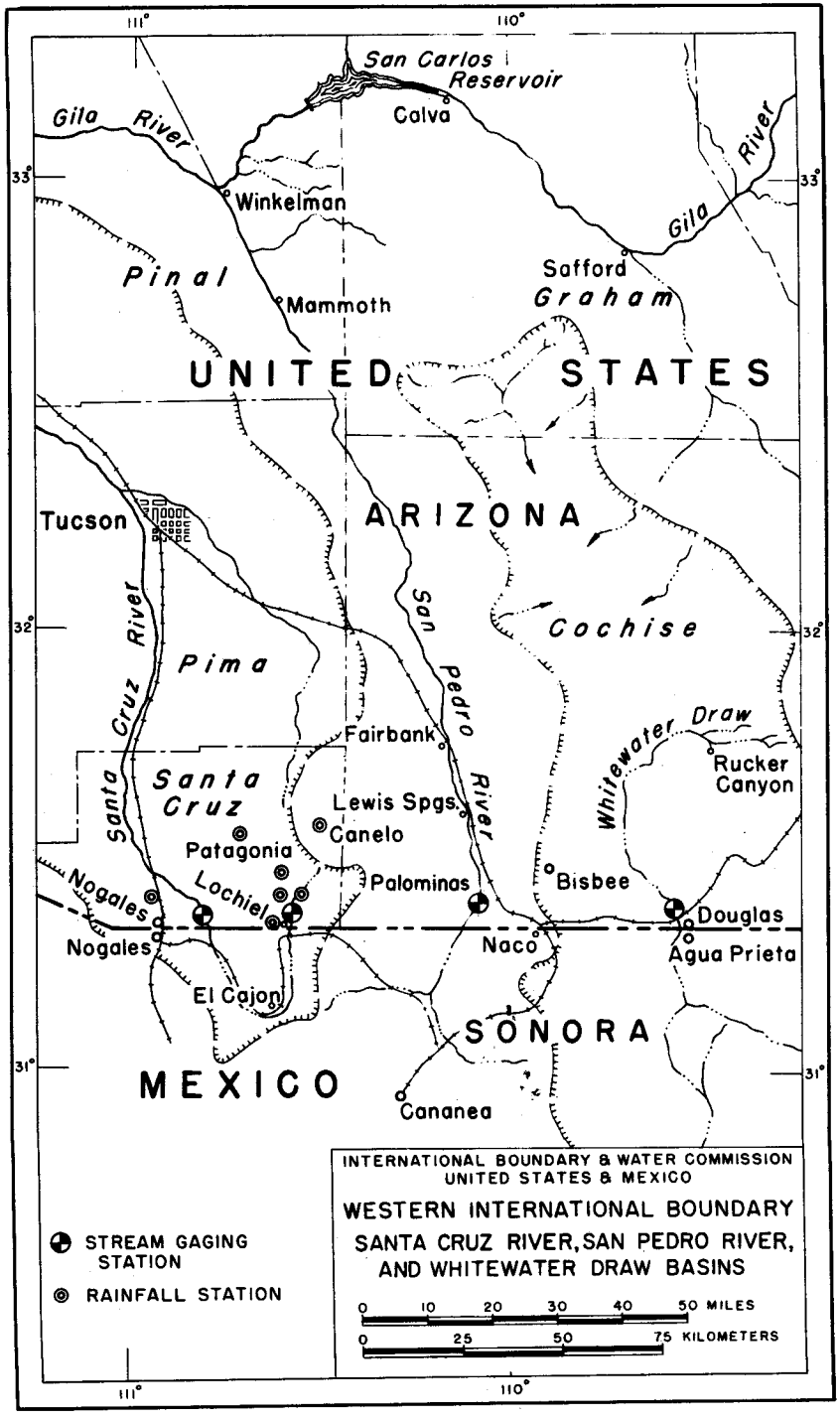
1991

The total area within the Tijuana River basin is 4,483 square kilometres, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the Tijuana River Valley Association or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 1991 was by pumping from ground water.

Designation of Areas	Drainage Basin–Square Kilometres			Irrigated Areas–Hectares		
	United Stated	Mexico	Total	United States	Mexico	Total
Cottonwood Creek						
above Morena Dam	295	0	295	0	0	0
Morena Dam to Barrett Dam	344	0	344	0	0	0
above Barrett Dam	640	0	640	0	0	0
below Barrett Dam and above Tecate Creek	168	0	168	0	0	0
above Tecate Creek	808	0	808	0	0	0
Campo Creek						
above International Boundary	220	10	230	0	0	0
Tecate Creek						
above International Boundary (not including Campo Creek)	49	166	215	0	0	0
Cottonwood Creek						
above International Boundary Station	1,070	176	1,246	0	0	0
Rio de las Palmas						
above Rodriguez Dam	18	2,541	2,559	0	(b) 0	0
Tijuana River						
above Nestor Gaging Station	1,186	3,279	4,465	119	0	119
above the Mouth	1,197	3,287	4,484	(a) 343	0	343

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.
(b) There was no irrigation in 1991 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodriguez Reservoir.


111°
110°
San Carlos Reservoir
Gila River
Calva
Winkelman
Gila River
33°
Pinal
Mammoth
Safford
Graham
UNITED STATES
Tucson
ARIZONA
Santa Cruz River
32°
Pima
San Pedro River
Cochise
Whitewater Draw
Fairbank
Rucker Canyon
Santa Cruz
Lewis Spgs.
Canelo
Patagonia
Nogales
Lochiel
Palominas
Bisbee
Douglas
Nogales
Naco
Agua Prieta
El Cajon
SONORA
31°
MEXICO
Cananea
INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
WESTERN INTERNATIONAL BOUNDARY
SANTA CRUZ RIVER, SAN PEDRO RIVER,
AND WHITEWATER DRAW BASINS
STREAM GAGING STATION
RAINFALL STATION
0 10 20 30 40 50 MILES
0 25 50 75 KILOMETERS

09-5375.00 WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 137 metres upstream from the Southern Pacific Railroad bridge, 2.4 kilometres upstream from the international boundary, and 3.2 kilometres west of Douglas, Arizona. Zero of gage is 1,191.51 metres above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 61 metres upstream from bridge. Datum 1.34 metres higher.
RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919, October 1919 to April 1922 (gage heights and discharge measurements only), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 1991 (July 1954 to March 1955, monthly discharge only).
REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico.
EXTREMES: Prior to 1936: Maximum recorded discharge, 97.7 m3/sec August 10, 1931 (gage height 3.70 metres); maximum estimated discharge, 115 m3/sec July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 143 m3/sec August 7, 1955; maximum gage height, 5.04 metres July 29, 1966; minimum daily discharge, no flow at times during most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0.05	0	0	0	0	0	0.14	0	0	0
2	0	0	.01	0	0	0	0	.18	.05	0	0	0
3	0	0	0	0	0	0	0	.03	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	.06	0	0	0	0	0	0	0	.01	0	0	0
7	0	0	0	0	0	0	0	0	.36	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	.22	0	0	0	0
11	0	0	0	0	0	0	0	.63	.02	0	0	.06
12	0	0	0	0	0	0	0	.07	.06	0	0	.03
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	.08	0	0	0	0
16	0	0	0	0	0	0	0	.44	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	.01
19	0	0	0	0	0	0	0	0	0	0	0	.20
20	0	0	0	0	0	0	0	0	0	0	0	.43
21	0	0	0	0	0	0	0	.07	.04	0	0	1.04
22	0	0	0	0	0	0	0	.07	.15	0	0	.16
23	0	0	0	0	0	0	0	0	0	0	0	.01
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0		0	0	0	0	0	0	0	0	0	0
30	0		0	0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	0.06	0	0.06	0	0	0	0	1.79	0.83	0	0	1.94

Current Year 1991 | Period 1936–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	1.76	1.46	6	0.23	! 1	0	0	5.2	39.9	556	0
Feb.	1.46	1.46	! 1	0	! 1	0	0	0	20.1	163	0
Mar.	1.69	1.46	1	.15	! 1	0	0	5.2	27.9	364	0
April	1.46	1.46	! 1	0	! 1	0	0	0	20.5	213	0
May	1.46	1.46	! 1	0	! 1	0	0	0	13.9	170	0
June	1.46	1.46	! 1	0	! 1	0	0	0	133	1,961	0
July	1.46	1.46	! 1	0	! 1	0	0	0	2,087	10,004	0
Aug.	2.03	1.46	16	.91	! 1	0	.06	155	3,389	17,861	0
Sept.	1.95	1.46	7	.64	! 1	0	.03	71.7	884	3,910	0
Oct.	1.46	1.46	! 1	0	! 1	0	0	0	425	7,528	0
Nov.	1.46	1.46	! 1	0	! 1	0	0	0	40.0	434	0
Dec.	2.11	1.46	21	1.25	! 1	0	.06	168	136	2,915	0
Yearly	2.11	1.46		1.25		0	0.01	405	7,216	27,533	0

! And other days

SEWAGE INFLUENT, DOUGLAS, ARIZONA
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about 1.6 kilometres west of the Douglas–Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 1991.

REMARKS: The older 4.9 thousand cubic metres per day trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1,1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the city of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 9.8 thousand cubic metres per day. The effluent from the Douglas Treatment Plant is discharged through a closed conduit to Mexico.

	Total Monthly Flows			Mean Daily Flows–Thousand Cubic Metres Per Day					
	Thousand Cubic Metres			Current Year 1991			Period 1952–1991		
Month	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	159	0	159	9.1	2.5	5.1	9.1	1.6	4.3
Feb.	168	0	168	13.9	2.2	6.0	13.9	2.1	4.3
Mar.	195	0	195	13.9	2.6	6.3	13.9	2.2	4.3
April	150	0	150	6.2	4.1	5.0	7.7	1.4	4.3
May	165	0	165	7.4	3.8	5.3	7.4	1.9	4.3
June	163	0	163	8.0	3.5	5.4	8.0	2.1	4.5
July	154	0	154	6.8	3.8	5.0	12.1	1.8	4.6
Aug.	167	0	167	9.6	3.5	5.4	10.1	1.4	4.7
Sept.	182	0	182	9.6	4.4	6.1	9.6	1.8	4.6
Oct.	156	0	156	6.6	4.0	5.0	12.0	2.3	4.4
Nov.	151	0	151	7.1	3.5	5.0	10.9	1.2	4.3
Dec.	164	0	164	7.0	3.8	5.3	12.6	1.9	4.3
Yearly	1,974	0	1,974	13.9	2.2	5.4	13.9	1.2	4.4

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 1.1 kilometre east of Palominas, 4.0 kilometres upstream from Green Brush Draw, 7.2 kilometres downstream from international boundary, and 19 kilometres southwest of Bisbee, Arizona. Zero of gage is 1,276.39 metres above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1991. Records obtained and furnished by U. S. Geological Survey to September 30, 1981; thereafter by the United States Section of the Commission.

REMARKS: There are some small diversions for irrigation of a few hundred acres above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 623 m3/sec on August 14, 1940 (gage height 4.93 metres present datum), from rating curve extended above 159 m3/sec on basis of slope-area measurement of peak flow; no flow at time in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 7.28 metres present datum), from flood marks; discharge not determined.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.16	0.09	1.64	0.41	0.04	0	0	0	0.01	0	0	0
2	.13	.08	27.9	.34	.04	0	0	0	.14	0	0	0
3	.08	.08	10.6	.28	.04	0	0	.14	.05	0	0	0
4	.07	.07	3.37	.24	.04	0	0	.27	0	0	0	.01
5	.08	.07	2.06	.21	.04	0	0	.90	.50	0	0	.02
6	.10	.07	1.25	.18	.03	0	0	0	.24	0	0	.02
7	.09	.07	.60	.15	.03	0	0	0	0	0	0	.02
8	.08	.07	.34	.15	.03	0	.29	0	0	0	0	.02
9	.08	.07	.34	.14	.03	0	0	0	0	0	0	.02
10	.09	.08	.34	.12	.03	0	0	0	0	0	0	.02
11	.11	.09	.34	.11	.02	0	0	0	0	0	0	.12
12	.12	.33	.34	.10	.02	0	0	0	.26	0	0	.32
13	.11	1.12	.34	.10	.02	0	0	0	.05	0	0	.05
14	.11	.98	.33	.09	.01	0	0	.06	0	0	0	.04
15	.11	.65	.32	.09	.01	0	0	.01	0	0	0	.03
16	.10	.42	.32	.09	.01	0	0	0	0	0	0	.03
17	.12	.30	.32	.09	.01	0	0	0	0	0	0	.03
18	.17	.25	.32	.08	.01	0	0	0	0	0	0	.12
19	.26	.21	.32	.08	.01	0	0	0	0	0	0	.31
20	.32	.16	.31	.07	0	0	0	.18	0	0	0	.10
21	.33	.14	.29	.07	.01	0	0	.01	0	0	0	.08
22	.30	.13	.35	.06	0	0	0	0	0	0	0	.08
23	.26	.12	.39	.05	0	0	0	2.40	0	0	0	.06
24	.21	.10	.36	.05	0	0	0	.22	0	0	0	.04
25	.18	.10	.34	.05	0	0	0	1.08	0	0	0	.05
26	.16	.10	.33	.05	0	0	0	2.54	0	0	0	.07
27	.15	.10	.41	.05	0	0	0	3.62	0	0	0	.21
28	.13	.16	.48	.05	0	0	0	.30	0	0	0	.12
29	.12		.51	.05	0	0	0	1.61	0	0	0	.07
30	.10		.51	.05	0	0	0	3.03	0	0	0	.04
31	.09		.46		0		0	.33		0		.04
Sum	4.52	6.21	56.13	3.65	0.48	0	0.29	16.70	1.25	0	0	2.14

Current Year 1991 | Period 1951-1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme-Cubic Metres per Second Day	High	Day	Low	Average	Volume-Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.	0.87	0.79	21	0.37	3	0.07	0.15	391	1,820	34,245	3.2
Feb.	1.02	.79	13	1.32	3	.07	.22	537	945	8,343	3.7
Mar.	2.20	.81	2	48.4	! 1	.25	1.81	4,850	945	9,129	16.4
April	.86	.77	1	.43	24	.03	.12	315	218	1,282	0
May	.78	.73	1	.05	13	0	.02	41.5	77.0	502	0
June	.73	.73	! 1	0	! 1	0	0	0	167	1,716	0
July	1.14	.73	8	2.83	! 1	0	.01	25.1	6,153	21,263	0
Aug.	2.10	.73	26	41.4	! 1	0	.54	1,443	9,847	44,860	204
Sept.	1.04	.73	5	1.52	! 3	0	.04	108	2,355	20,160	13.9
Oct.	.76	.76	1	0	! 1	0	0	0	2,292	58,371	0
Nov.	.76	.76	1	0	! 1	0	0	0	326	3,161	0
Dec.	.96	.76	12	.75	! 1	0	.07	185	1,984	31,428	7.6
Yearly	2.20	0.73		48.4		0	0.25	7,896	27,129	77,448	5,427

! And other days

09-4800.00 SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 4.0 kilometres northeast of Lochiel, Arizona, and 2.7 kilometres upstream from the international land boundary. The elevation of the zero of the gage has not been determined, but topographic maps indicate the elevation of the stream bed at the gage is about 1,408 metres.
RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1991.
REMARKS: There are small diversions by ground water pumping for irrigating about 80.9 hectares above this station.
EXTREMES: Maximum discharge, 362 m3/sec on August 15, 1984 (gage height 3.19 metres); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03	0.03	0.05	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02
2	.03	.03	.06	.03	0	.02	.01	.01	.02	.01	.01	.02
3	.03	.03	.04	.03	0	.02	0	.01	.02	.01	.01	.02
4	.03	.03	.03	.03	.01	.02	0	.01	.01	.01	.01	.02
5	.03	.03	.03	.03	.02	.02	0	.01	.01	.01	.01	.02
6	.04	.03	.03	.03	.02	.02	0	.01	.01	.01	.01	.02
7	.03	.03	.03	.03	.02	.02	0	.01	.01	.01	.01	.02
8	.03	.03	.03	.03	.02	.02	0	.01	.01	.01	.01	.02
9	.03	.03	.03	.03	.02	.02	0	.01	.01	.01	.01	.02
10	.03	.03	.03	.03	.02	.01	0	.02	.01	.01	.01	.02
11	.03	.03	.03	.03	.02	.01	0	.02	.01	.01	.01	.02
12	.03	.05	.03	.03	.02	.01	0	.02	.01	.01	.01	.02
13	.03	.04	.03	.02	.02	.01	0	.01	.01	.01	.01	.02
14	.03	.03	.03	.03	.02	.01	0	.02	.01	.01	.02	.02
15	.03	.03	.03	.02	.02	.01	0	.02	.01	.01	.02	.02
16	.03	.03	.03	.02	.02	.01	0	.02	.01	.01	.02	.02
17	.03	.03	.03	.02	.02	.01	0	.02	.01	.01	.02	.02
18	.03	.03	.03	.02	.01	.01	0	.02	.02	.01	.02	.03
19	.03	.03	.03	.02	.01	.01	0	.03	.02	.01	.02	.02
20	.03	.03	.03	.02	.01	.01	0	.02	.02	.01	.02	.02
21	.03	.03	.03	.02	.01	.01	.01	.01	.02	.01	.02	.02
22	.03	.03	.03	.02	.02	.01	.01	.04	.02	.01	.02	.02
23	.03	.03	.03	.02	.02	.01	.01	.06	.02	.01	.02	.02
24	.03	.03	.03	.02	.01	.01	.01	.01	.02	.01	.02	.02
25	.03	.03	.03	.02	.01	.01	.01	.03	.02	.01	.02	.02
26	.03	.03	.03	.02	.01	.01	.07	.02	.01	.01	.02	.02
27	.03	.03	.03	.02	.01	.01	.02	.02	.01	.01	.02	.02
28	.03	.05	.03	.02	.01	.01	.01	.01	.01	.01	.02	.02
29	.03		.03	.02	.01	.01	.01	.01	.01	.01	.02	.02
30	.03		.03	.01	.01	.01	.01	.02	.01	.01	.02	.02
31	.03		.03		.02		.01	.01		.01		.02
Sum	0.94	0.89	0.99	0.72	0.45	0.39	0.20	0.55	0.40	0.31	0.47	0.63

Current Year 1991 | Period 1949–1991

Month	Extreme Gage Metres High	Extreme Gage Metres Low	Extreme–Cubic Metres per Second Day	ϕ High	Day	ϕ Low	Average	Volume–Thousands of Cubic Metres Total	Average	Maximum	Minimum
Jan.			6	0.04	! 1	0.03	0.03	81.2	194	3,571	1.6
Feb.			!12	.05	! 1	.03	.03	76.9	113	1,233	2.2
Mar.			2	.06	! 4	.03	.03	85.5	136	2,594	.9
April			! 1	.03	30	.01	.02	62.2	53.0	380	0
May			! 5	.02	! 2	0	.01	38.9	29.3	210	0
June			! 1	.02	!10	.01	.01	33.7	21.8	208	0
July			26	.07	! 3	0	.01	17.3	617	5,267	2.0
Aug.			23	.06	! 1	.01	.02	47.5	1,258	14,207	.1
Sept.			! 2	.02	! 1	.01	.01	34.6	387	3,249	0
Oct.			! 1	.01	! 1	.01	.01	26.8	374	5,837	0
Nov.			!14	.02	! 1	.01	.02	40.6	76.6	497	0
Dec.			18	.03	! 1	.02	.02	54.4	137	1,348	0
Yearly				0.07		0	0.02	600	3,397	21,433	155

ϕ Mean daily ! And other days

09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 8.9 kilometres east of Nogales, Arizona, 1.3 kilometre downstream from the international boundary and 9.7 kilometres upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 1,128.53 metres above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record); January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only); May 1930 to December 1933; and July 1935 through 1991.

REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1991.

EXTREMES: Maximum discharge, 949 m3/sec on October 9, 1977 (gage height 4.72 metres); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1991 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.28	0.85	19.4	1.93	0.37	0.05	0.01	0.03	0.01	0	0	0
2	.27	.85	57.2	1.64	.37	.05	.01	.02	.02	0	0	0
3	.24	.85	13.1	1.44	.40	.05	0	.02	.02	0	0	0
4	.25	.82	6.66	1.27	.37	.04	0	.02	.01	0	0	0
5	.37	.76	5.78	1.13	.34	.04	0	.02	.02	0	0	0
6	4.64	.82	5.24	1.02	.34	.04	2.38	.02	.01	0	0	0
7	2.83	.79	3.34	.93	.34	.03	.34	0	0	0	0	0
8	1.76	.74	2.58	.88	.31	.03	.03	0	0	0	0	0
9	1.30	.74	2.27	.88	.24	.03	.01	0	0	0	0	0
10	.99	.74	1.93	1.02	.23	.04	.01	0	0	0	0	0
11	.88	.82	1.59	.93	.23	.05	.01	0	0	0	0	0
12	.85	12.5	1.33	.82	.24	.05	.01	0	0	0	0	0
13	.76	12.1	1.19	.82	.23	.07	.01	0	0	0	0	0
14	.68	5.66	1.02	.76	.20	.07	.01	0	.03	0	0	0
15	.65	4.19	.91	.76	.20	.04	.01	0	0	0	0	0
16	.71	3.31	.99	.68	.15	.03	.01	0	0	0	0	0
17	2.52	2.72	.88	.57	.10	.03	.01	0	0	0	0	0
18	2.89	2.46	.76	.59	.09	.02	.01	0	0	0	0	.01
19	2.44	2.29	.71	.57	.07	.02	.01	0	0	0	0	.01
20	2.04	2.04	.68	.48	.07	.02	.01	0	0	0	0	.59
21	1.73	1.84	.96	.45	.05	.02	0	0	0	0	0	1.05
22	1.56	1.78	1.27	.51	.05	.02	0	0	0	0	0	.91
23	1.42	1.73	1.22	.51	.05	.02	0	0	0	0	0	.79
24	1.22	1.56	1.05	.48	.05	.02	0	0	0	0	0	.65
25	1.13	1.44	1.05	.51	.04	.02	0	0	0	0	0	.57
26	1.10	1.47	1.08	.51	.04	.02	0	0	0	0	0	.54
27	1.02	1.44	1.56	.48	.04	.01	0	0	0	0	0	.45
28	.96	12.5	2.61	.48	.04	.01	.01	0	0	0	0	.34
29	.96		3.06	.48	.04	.01	.01	0	0	0	0	.23
30	.88		2.86	.45	.04	.01	.01	0	0	0	0	.16
31	.85		2.44		.05		.02	.01		0		.11
Sum	40.18	79.81	146.72	23.98	5.38	0.96	2.94	0.14	0.12	0	0	6.41

Current Year 1991 | Period 1936–1991

Month	Extreme Gage Metres		Extreme–Cubic Metres per Second				Average	Volume–Thousands of Cubic Metres			
	High	Low	Day	♦ High	Day	♦ Low		Total	Average	Maximum	Minimum
Jan.			6	4.64	3	0.24	1.30	3,472	2,588	37,352	0
Feb.			!12	12.5	! 8	.74	2.85	6,896	2,133	25,344	0
Mar.			2	57.2	20	.68	4.73	12,677	1,940	24,145	0
April			1	1.93	!21	.45	.80	2,072	498	3,645	0
May			3	.40	!25	.04	.17	465	148	1,272	0
June			!13	.07	!27	.01	.03	82.9	104	1,787	0
July			6	2.38	! 3	0	.09	254	3,345	19,255	.1
Aug.			1	.03	! 7	0	0	12.1	6,774	56,481	12.1
Sept.			14	.03	! 7	0	0	10.4	1,932	111,633	0
Oct.			! 1	0	! 1	0	0	0	2,349	72,806	0
Nov.			! 1	0	! 1	0	0	0	654	9,108	0
Dec.			21	1.05	! 1	0	.21	554	3,000	41,405	0
Yearly				57.2		0	0.84	26,495	25,465	108,071	2,756

♦ Mean daily ! And other days

SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Three 61-centimetre Parshall flumes, each with a water-stage recorder and continuous totalizer, one located at the international boundary for measuring effluent from Nogales, Sonora, one located at the head of the treatment plant, and one in the plant effluent line. Nogales International Treatment Plant is located adjacent to I-19, approximately 14.5 kilometres north of the international boundary, all within the city of Nogales, Santa Cruz County, Arizona.
RECORDS: Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 1991.
REMARKS: Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately 3.2 kilometres north of the international boundary. Nogales International Treatment Plant treats combined sewage from both Nogales, Arizona and Nogales, Sonora by means of aerated stabilization lagoons with a capacity of 59.6 thousand cubic metres per day. Chlorinated plant effluent is discharged directly to the Santa Cruz River.

	Total Monthly Flows				Mean Daily Flows-Thousand Cubic Metres Per Day					
	Thousand Cubic Metres				Current Year 1991			Period 1952-1991		
Month	U.S.	Mexico	Plant*	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	550	911	146	1,607	60.6	43.1	51.8	60.6	2.5	17.2
Feb.	587	935	147	1,669	79.2	50.6	59.6	79.2	2.5	17.9
Mar.	702	1,083	115	1,900	70.5	47.8	61.3	71.4	2.8	17.8
April	596	803	16.7	1,416	62.6	38.2	47.2	62.6	2.6	16.7
May	509	846	0	1,355	46.1	37.5	43.7	46.1	2.1	15.8
June	423	743	0	1,166	42.9	34.5	38.9	42.9	2.6	14.7
July	450	771	0	1,221	49.2	32.9	39.4	51.7	2.6	15.6
Aug.	458	704	0	1,162	47.3	31.9	37.5	49.7	2.8	17.1
Sept.	411	842	0	1,253	45.8	36.6	41.8	46.6	3.0	18.1
Oct.	494	724	0	1,218	42.9	36.6	39.3	76.3	2.6	18.0
Nov.	452	751	0	1,203	46.5	36.9	40.1	46.5	3.0	17.5
Dec.	547	869	0	1,416	61.6	36.4	45.7	61.6	1.3	17.7
Yearly	6,179	9,982	425	16,586	79.2	31.9	45.4	79.2	1.3	17.0

* Nogales Wash Pump Plant

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED
IN MILLIMETRES

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 9N, Arizona			
	1991	Average 1973–1991	1991	Averages 1930–1991	1991	Averages 1930–1991	1991	Averages 1953–1991		
Jan.	#	40	44	31	52	32	51	30		
Feb.	36	32	56	27	69	28	40	20		
Mar.	122	35	62	22	57	24	75	23		
April	0	13	0	10	0	10	0	8		
May	#	8	0	4	0	5	0	6		
June	T	15	12	19	2	12	6	10		
July	28	117	37	105	50	112	25	122		
Aug.	71	92	71	107	83	103	131	100		
Sept.	#	58	59	45	41	45	68	43		
Oct.	15	37	14	26	8	29	8	35		
Nov.	18	23	24	20	34	21	19	16		
Dec.	132	42	94	36	88	37	77	37		
Yearly	422	512	473	452	484	458	500	450		

\# Missing record T Trace

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1991.

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (Metres)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	1,527	1930	R. E. Ewing
Nogales Sanitation Plant 9N, Arizona	S	31° 25'	110° 57'	1,085	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	1,277	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	1,481	Jan. 1973	I. B. & W. C.

S Standard 203 millimetre rain gage

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN IN DEGREES CELSIUS

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 14.5 kilometres north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 3.2 kilometres north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 203 millimetres rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

For specific location of this station, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

	Nogales Sanitation Plant – 9N		
	1991		
Month	Mean	Max.	Min.
Jan.	7.3	21.1	– 8.3
Feb.	10.9	25.6	– 5.0
Mar.	9.8	28.3	– 5.0
April	14.1	30.0	– 3.3
May	18.1	35.6	0.0
June	21.9	38.9	4.4
July	26.2	39.4	12.8
Aug.	25.6	37.8	13.9
Sept.	22.2	35.6	10.0
Oct.	17.9	34.4	– 4.4
Nov.	10.6	30.6	– 5.0
Dec.	8.4	22.8	– 5.6
Yearly	16.1	39.4	– 8.3

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG SANTA CRUZ RIVER, SAN PEDRO RIVER, AND WHITEWATER DRAW

1991

The drainage basin areas tabulated below are derived from the best available maps from both the United States and Mexico.

Data on irrigated areas in the Whitewater Draw Basin were furnished by the Soil Conservation Service at Douglas, Arizona and estimated from aerial photographs.

Designation of Areas	Drainage Basin–Square Kilometres			Irrigated Areas–Hectares		
	United Stated	Mexico	Total	United States	Mexico	Total
Santa Cruz River:						
Above Lochiel, Arizona Gaging Station	212	0	212	40	0	40
Above El Cajon, Mexico Gaging Station	464	324	788	40	952	992
Above Nogales, Arizona Gaging Station	479	901	1,380	40	1,091	1,131
San Pedro River:						
Above Palominas, Arizona Gaging Station	238	*1,621	1,859	578	1,400	1,978
Whitewater Draw:						
Above Douglas, Arizona Gaging Station	2,650	0	2,650	N/A	0	N/A

* An additional 122 square kilometres in Mexico is tributary to the San Pedro River downstream from this station.

N/A Not Available – SCS does not have current data available from ground/aerial survey.